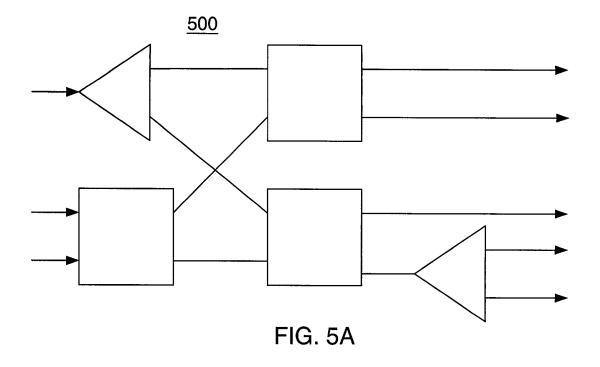
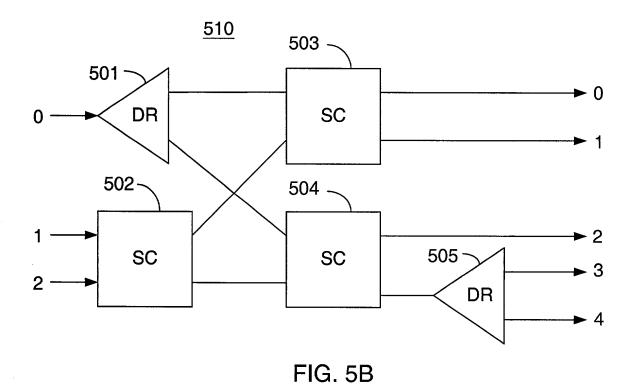


FIG. 4





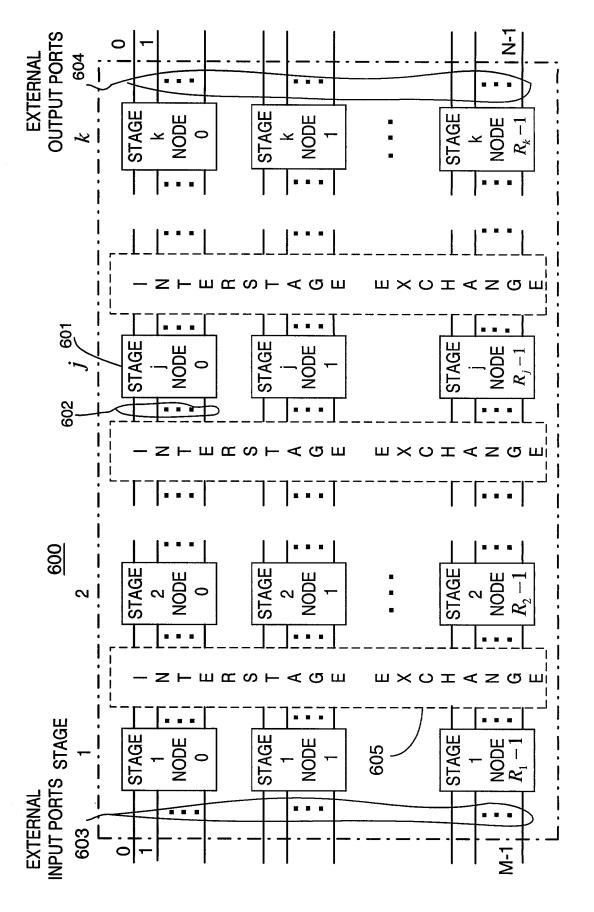
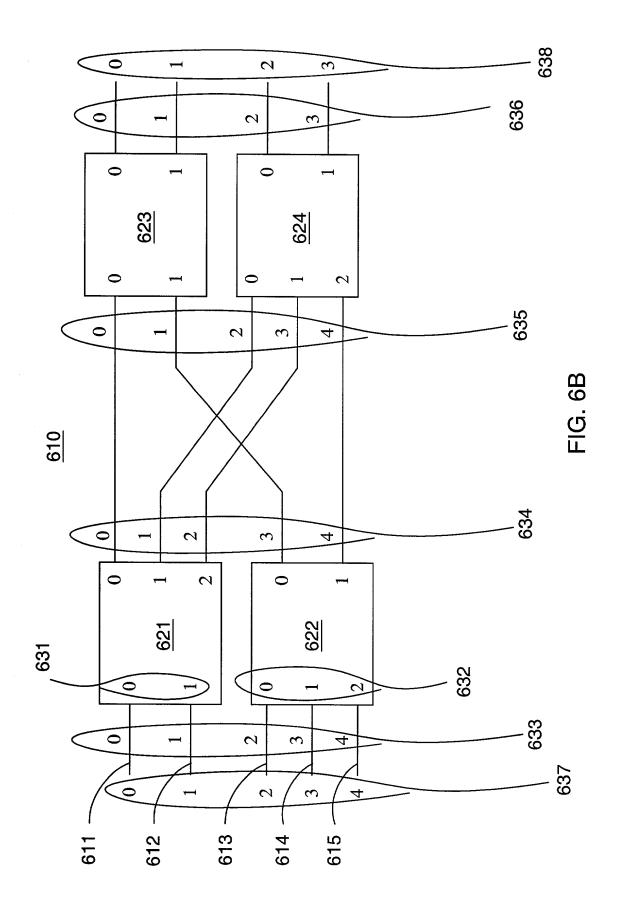
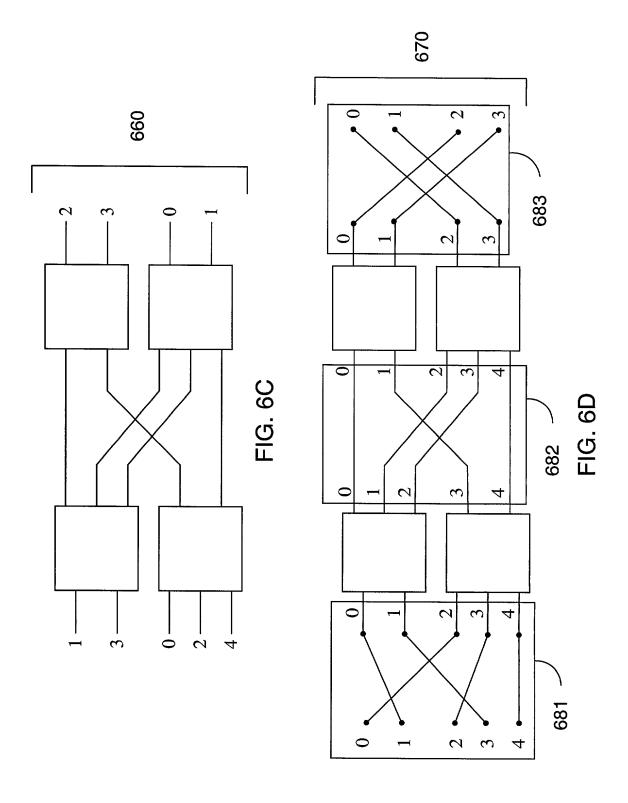
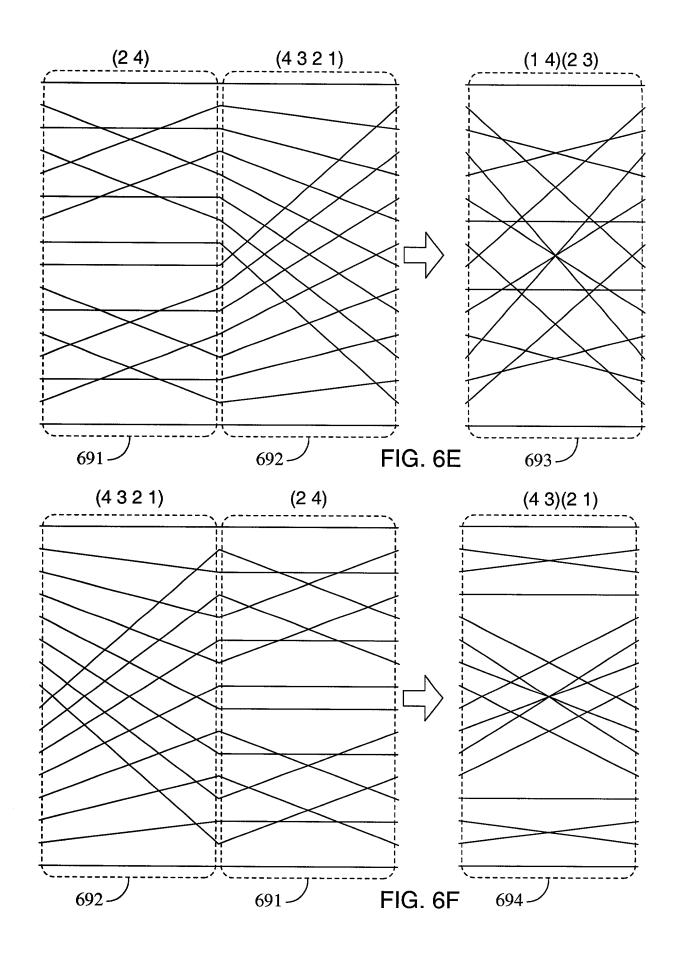
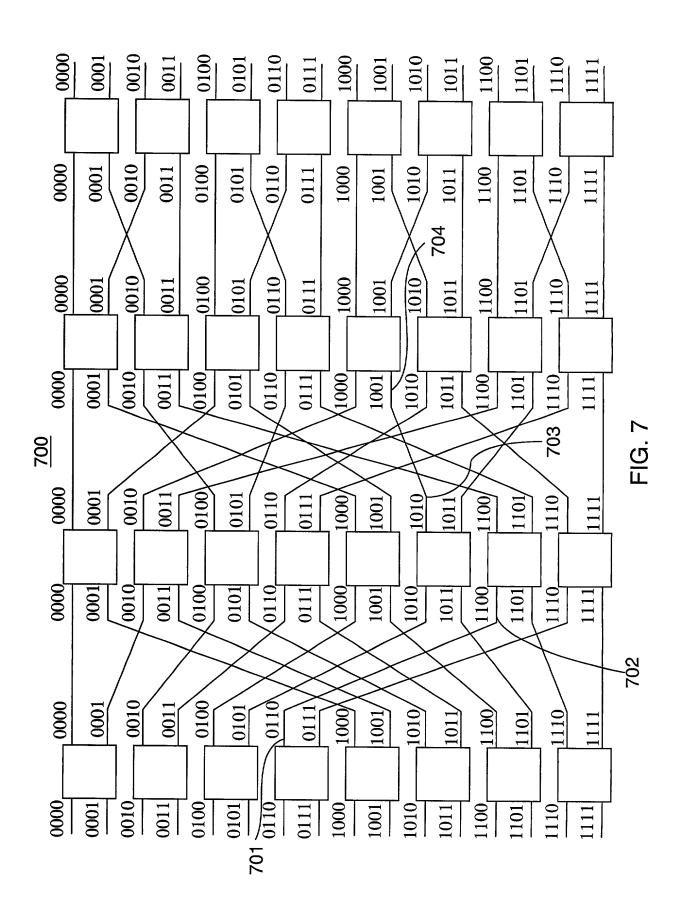


FIG. 6A

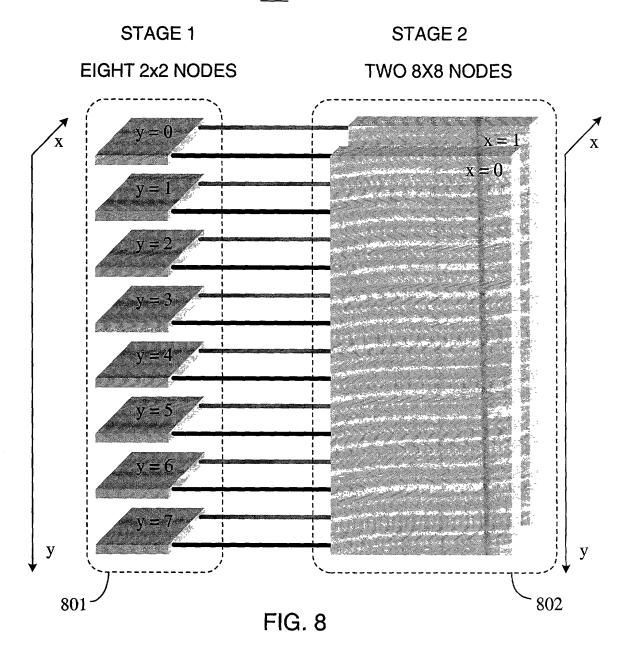


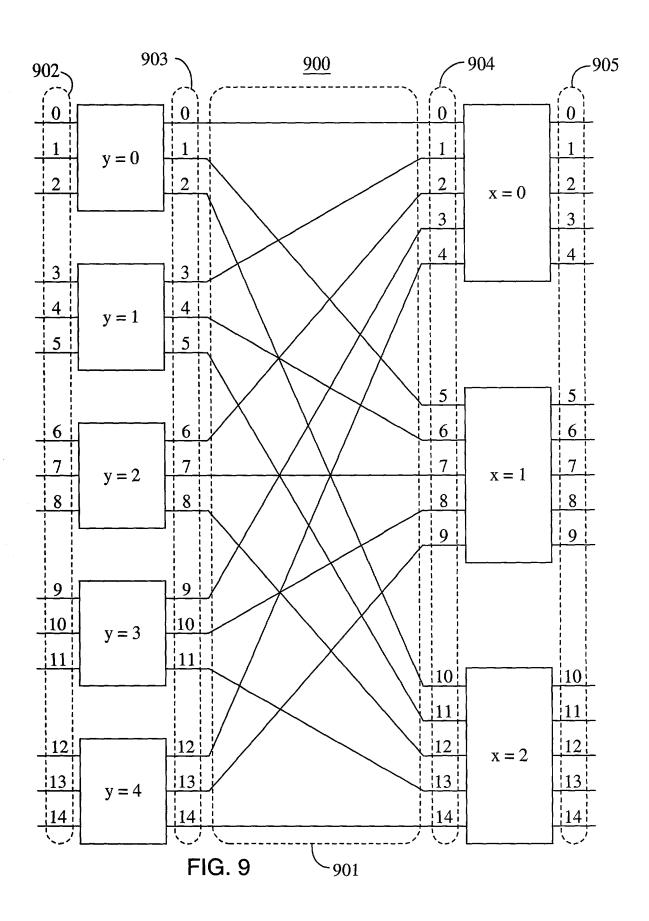


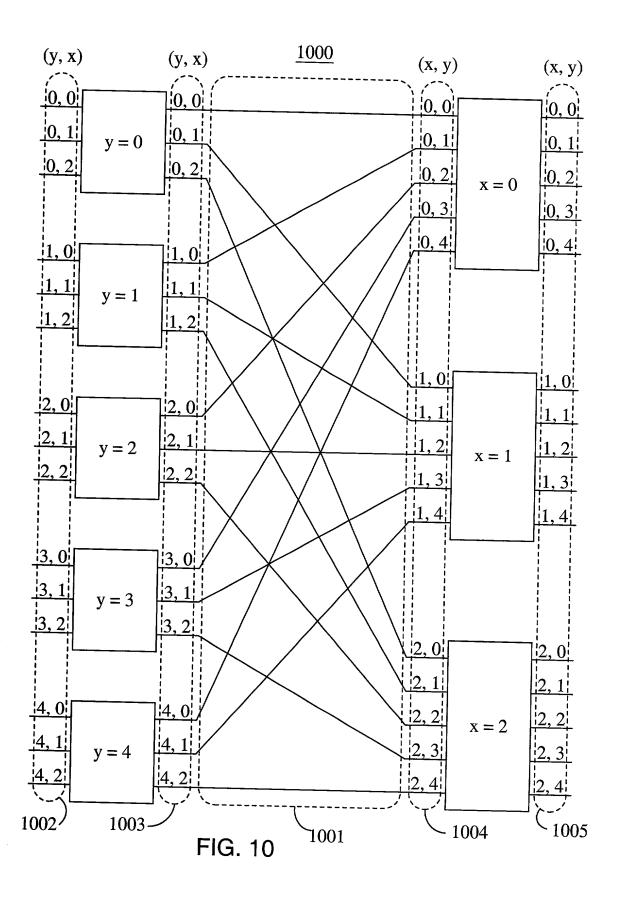


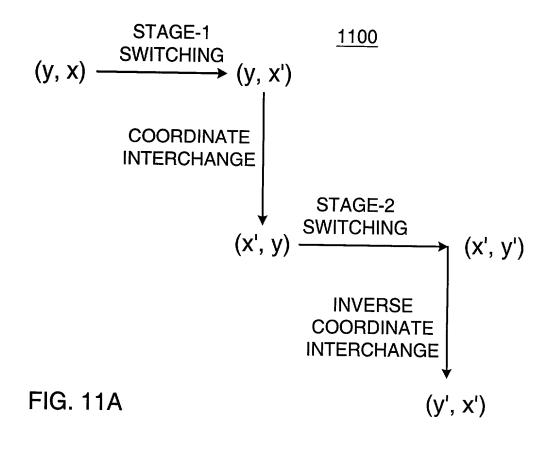


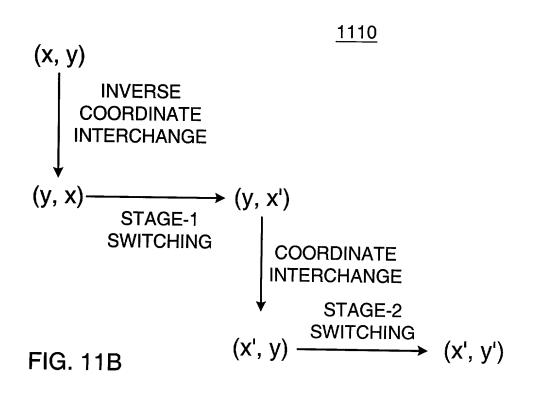
<u>800</u>

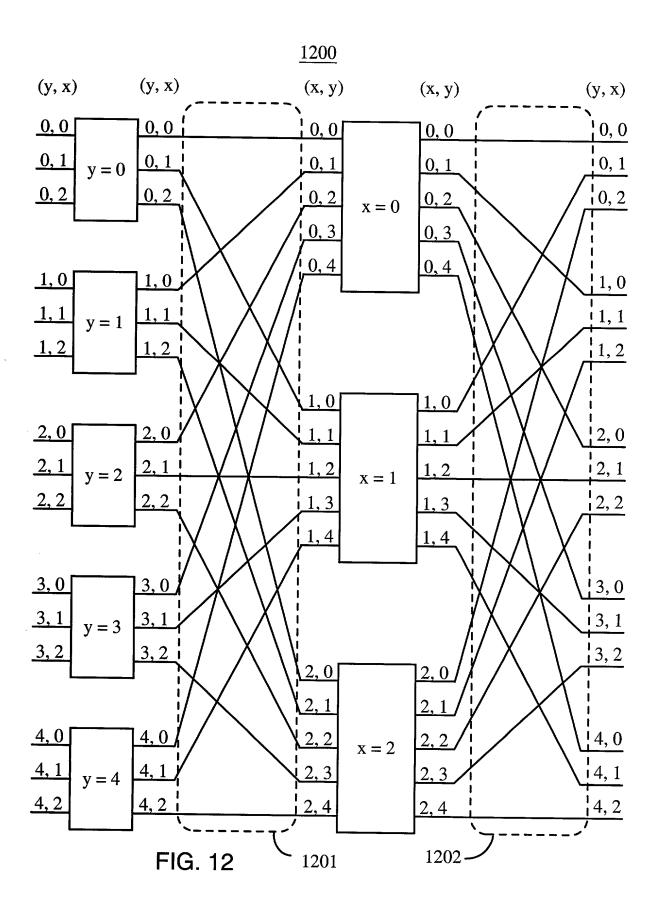


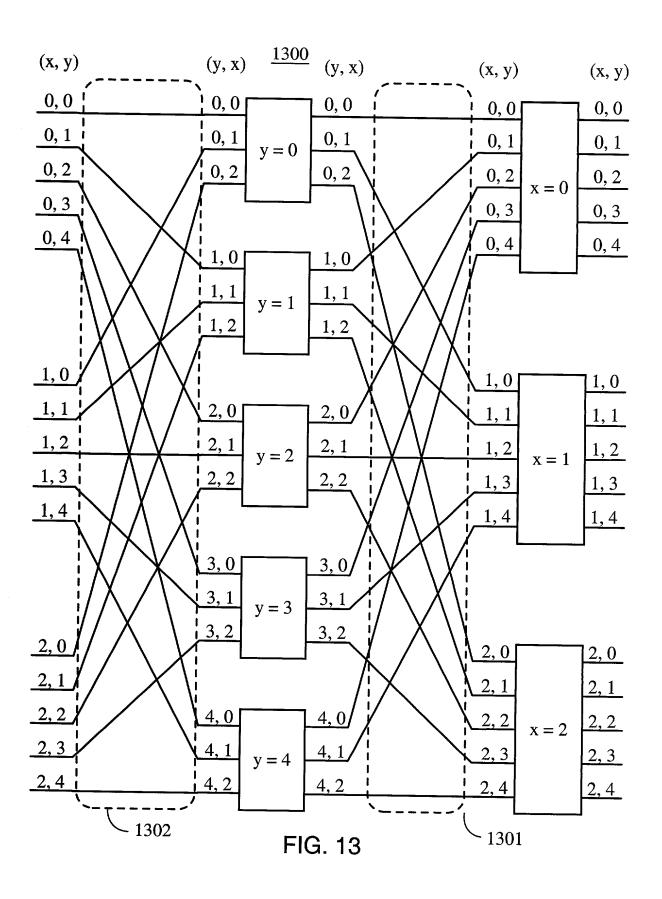


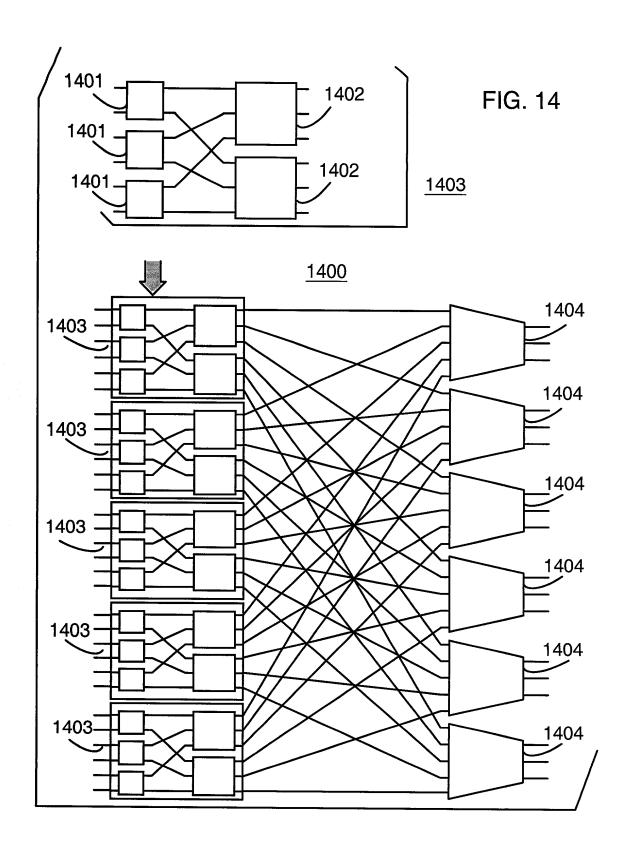












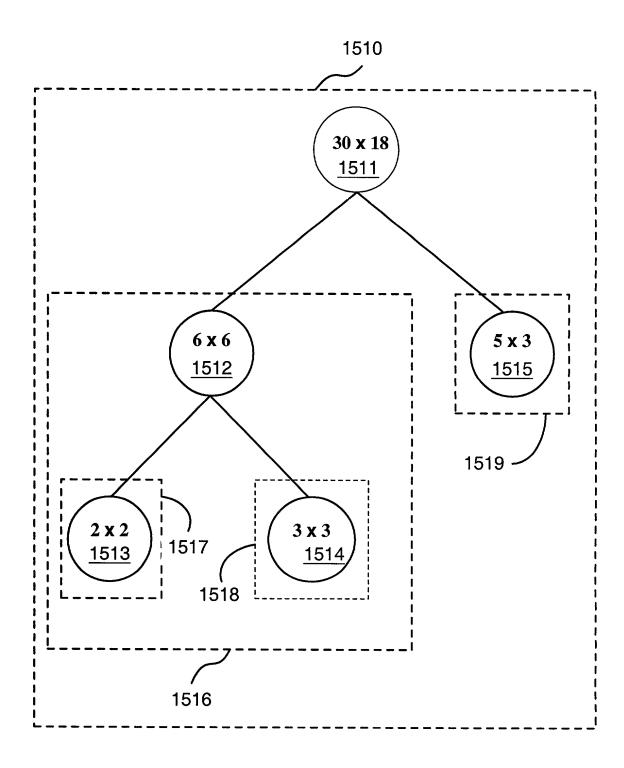
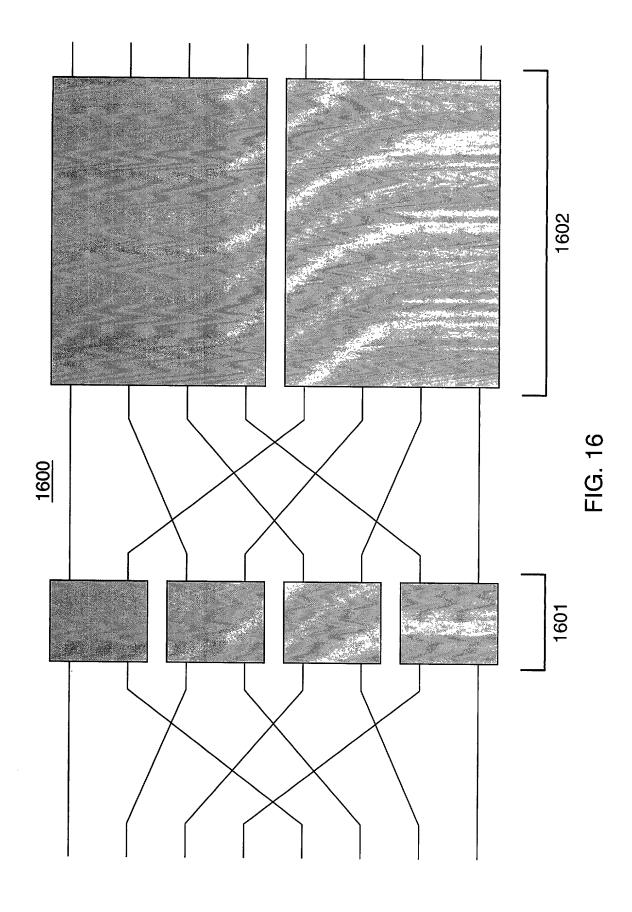
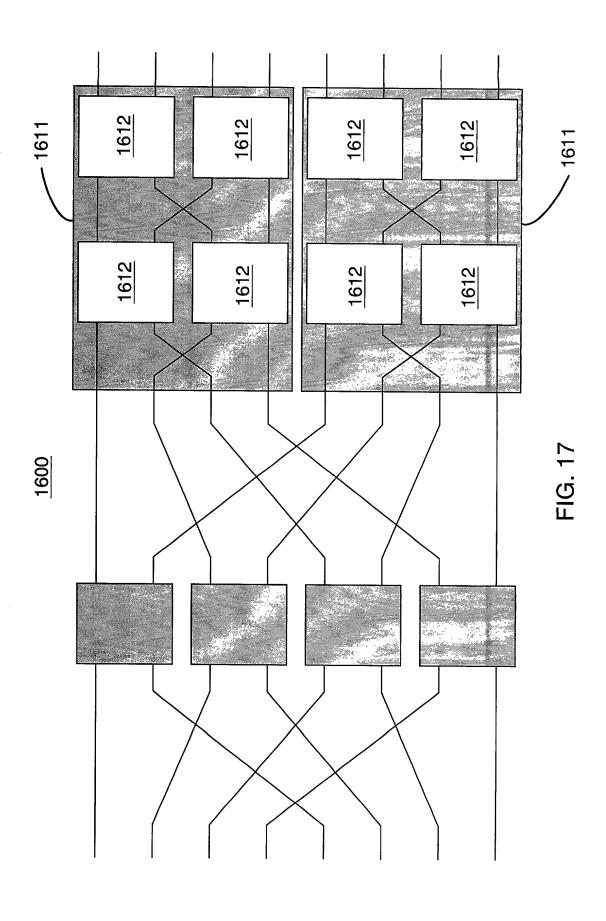
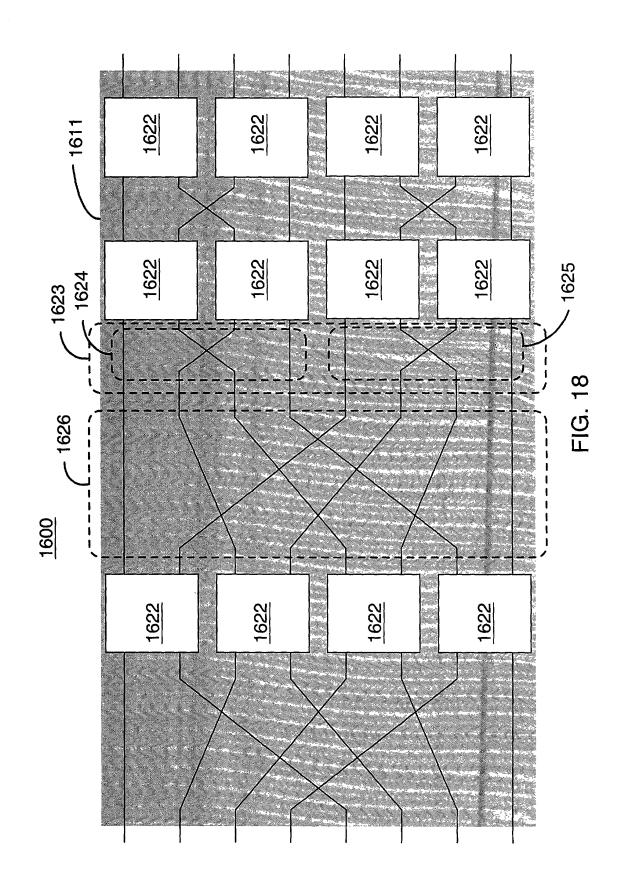
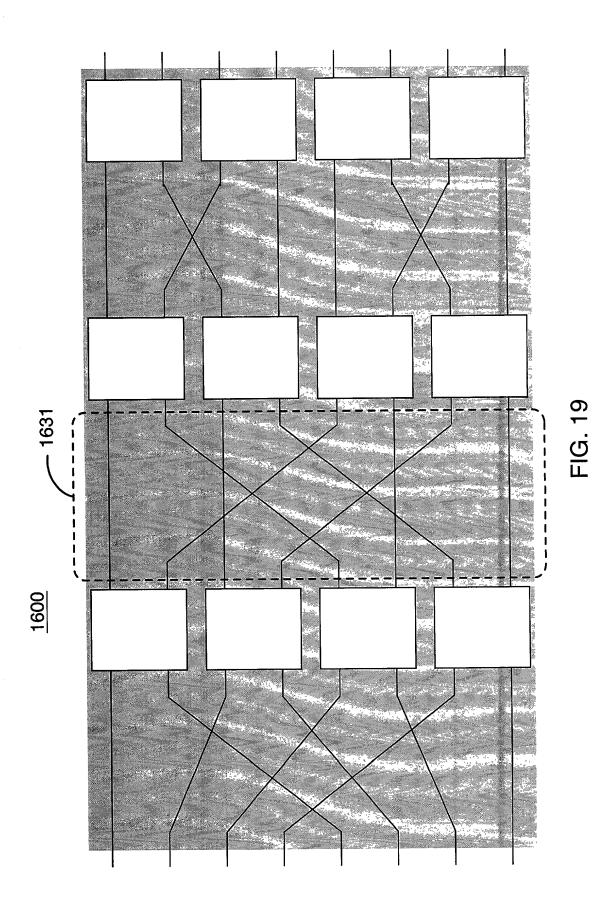


FIG. 15









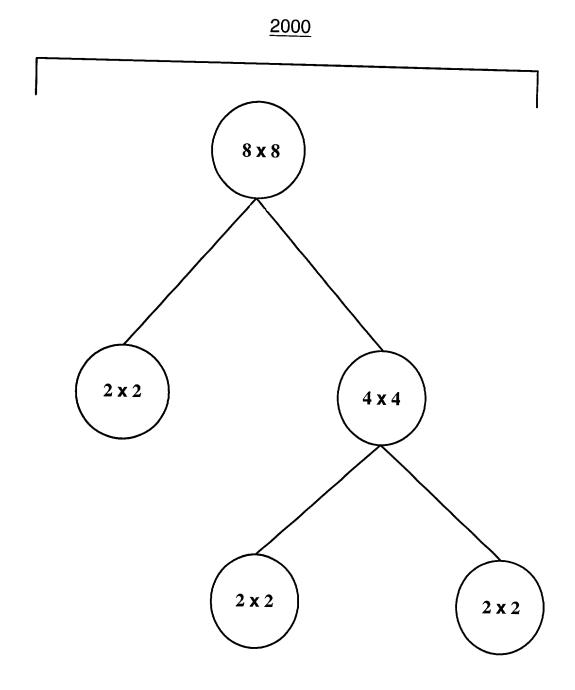
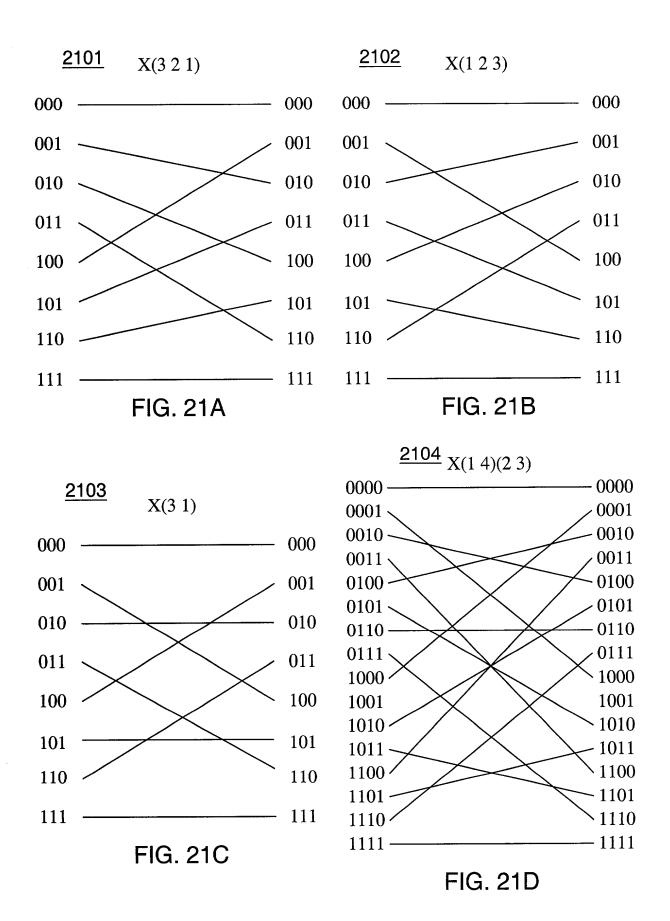
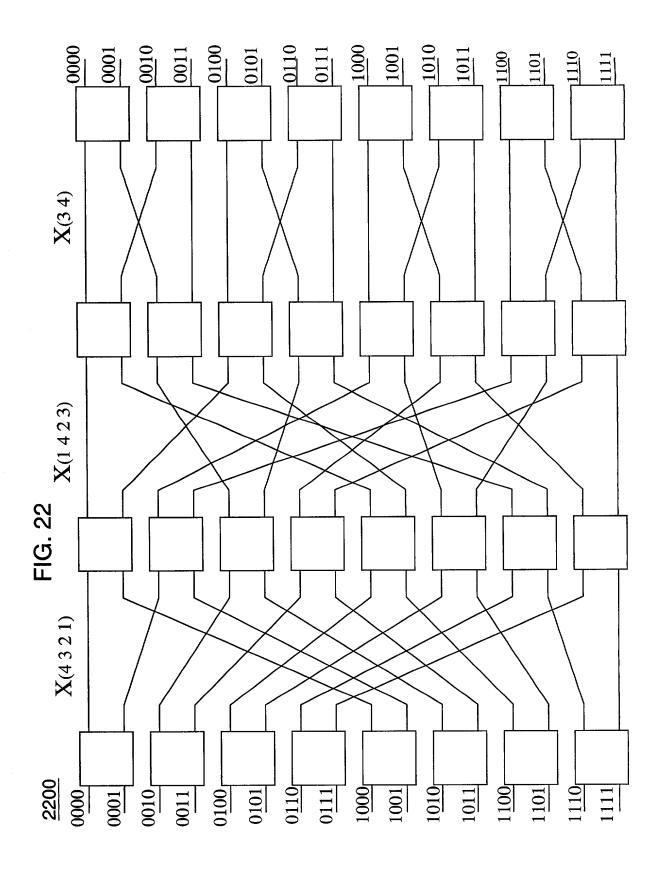
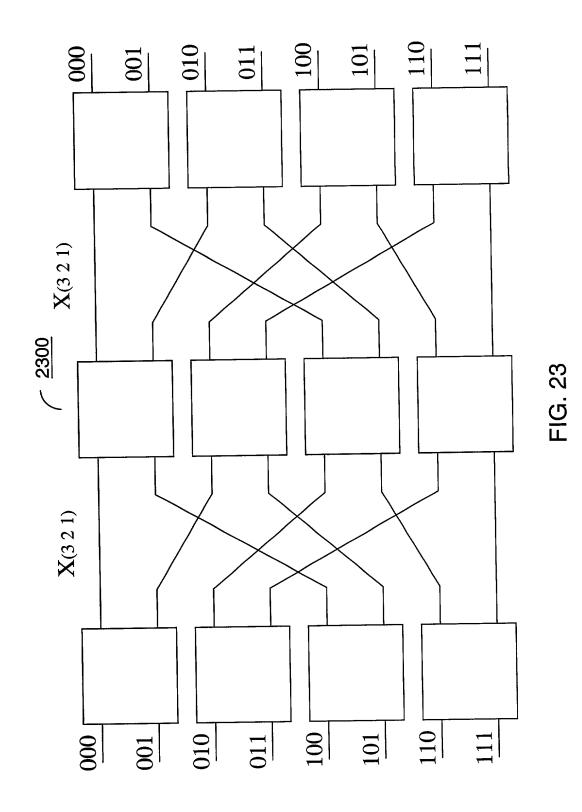


FIG. 20







<u>2400</u>

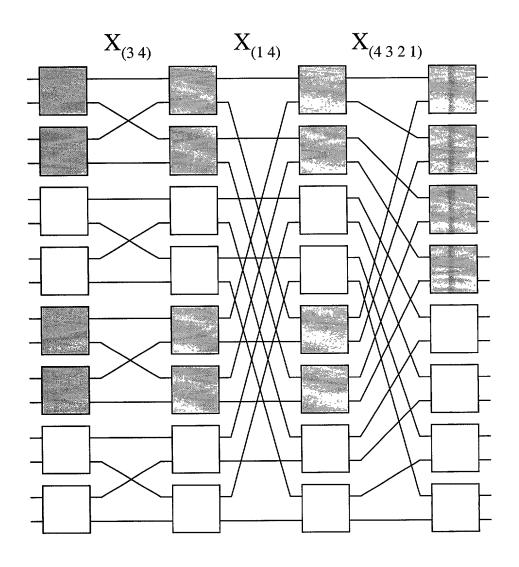
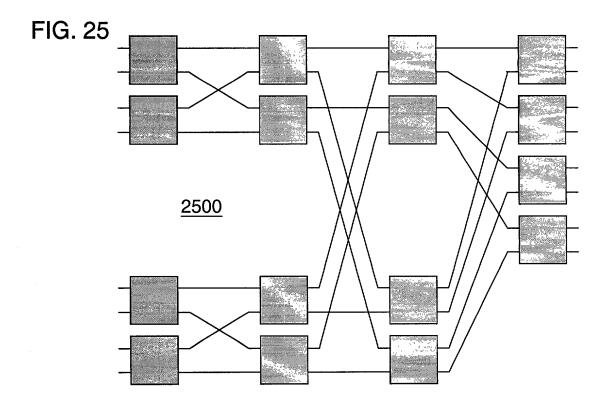
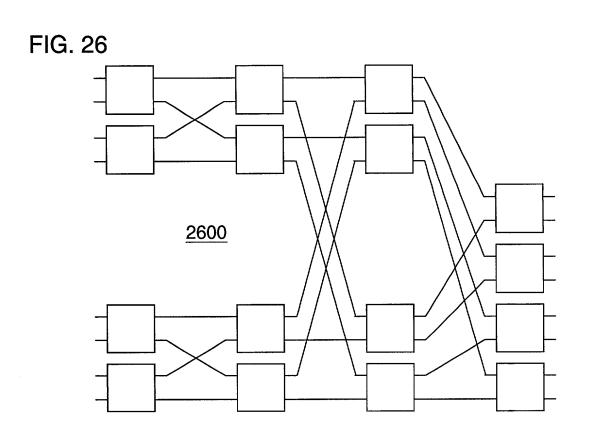
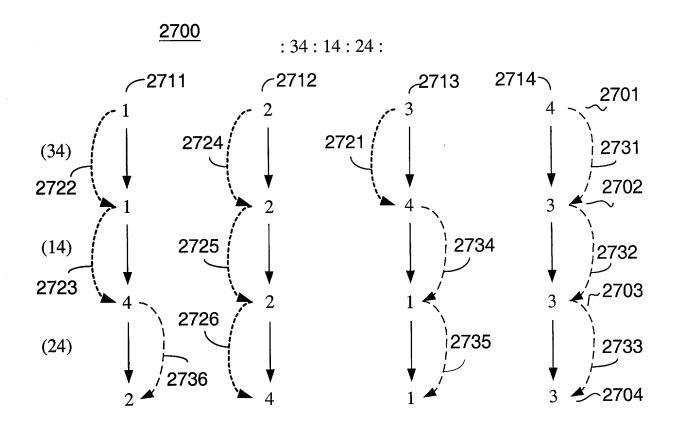


FIG. 24







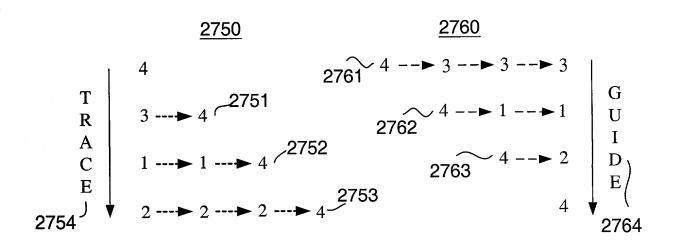


FIG. 27

Trace
$$\begin{pmatrix} 4321 \end{pmatrix} : (14) : (24) : (34) : \\ 1 \longrightarrow 4 \\ 2 \longrightarrow 1 \longrightarrow 4 \\ 2 \longrightarrow 2 \longrightarrow 4 \\ 4 \longrightarrow 3 \longrightarrow 3 \longrightarrow 4$$

FIG. 28A

FIG. 28B

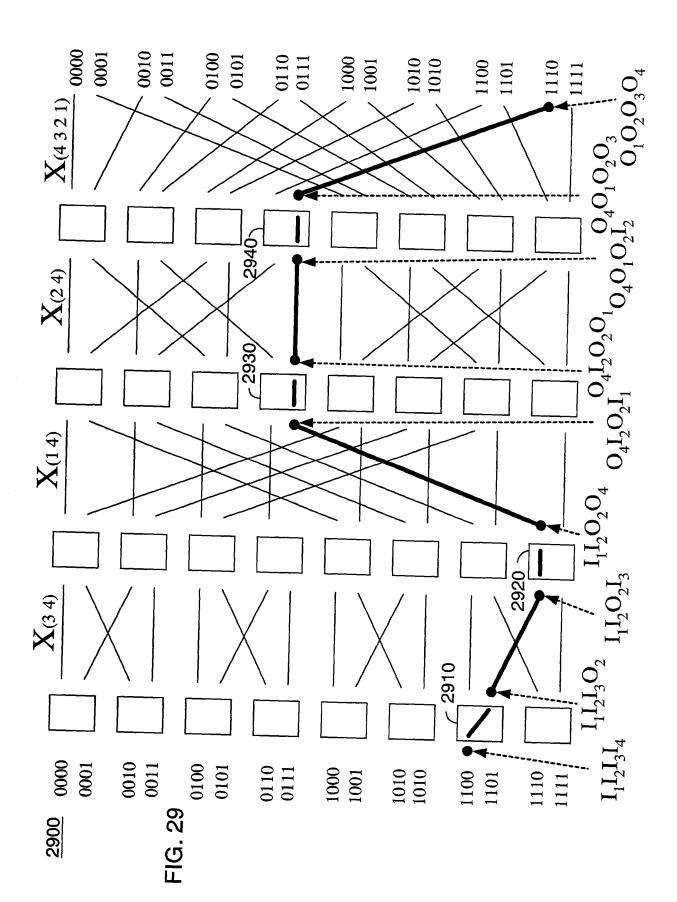
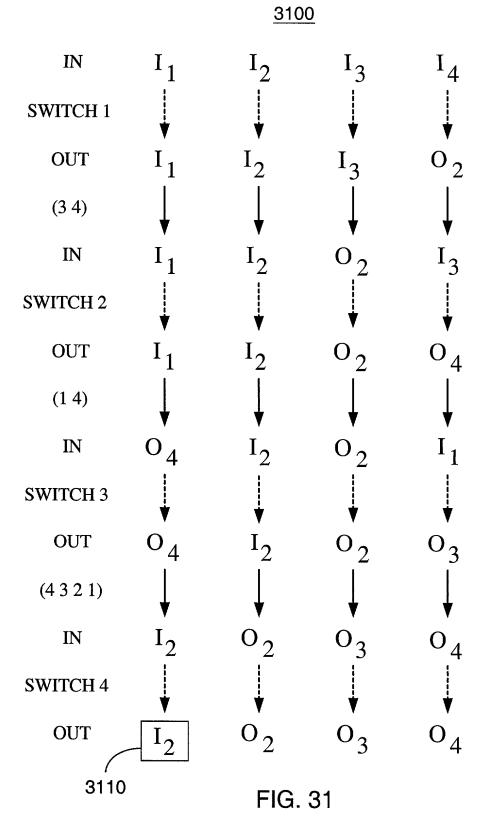


FIG. 30A

FIG. 30B



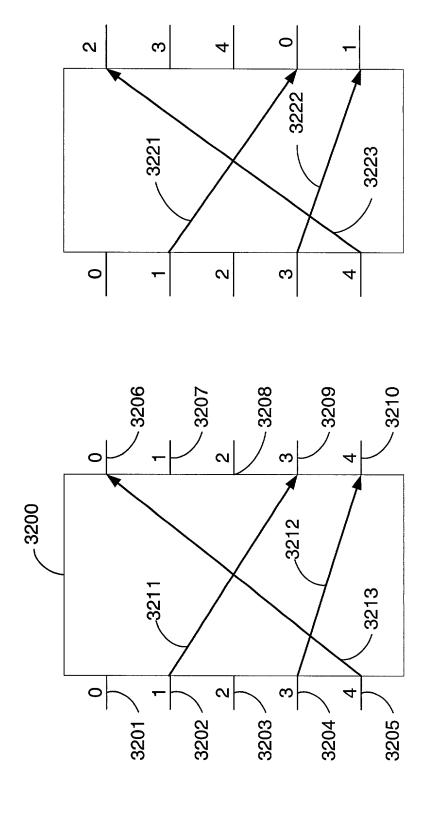
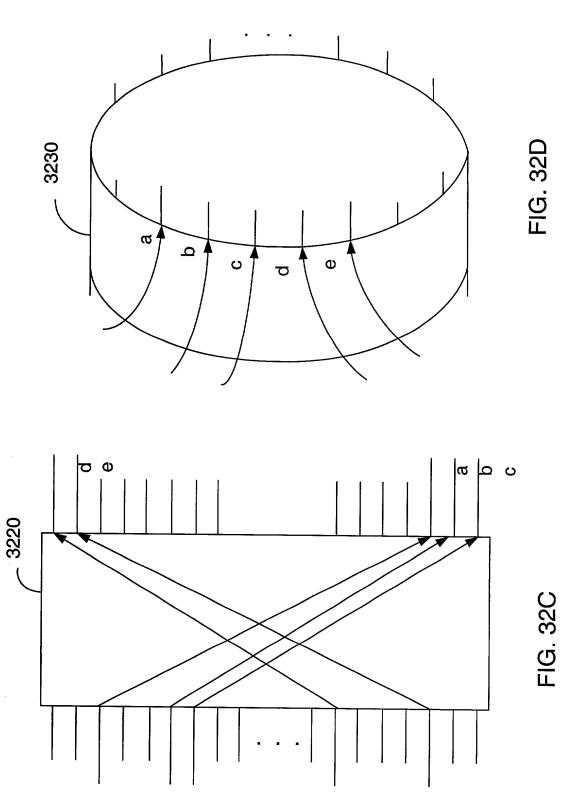
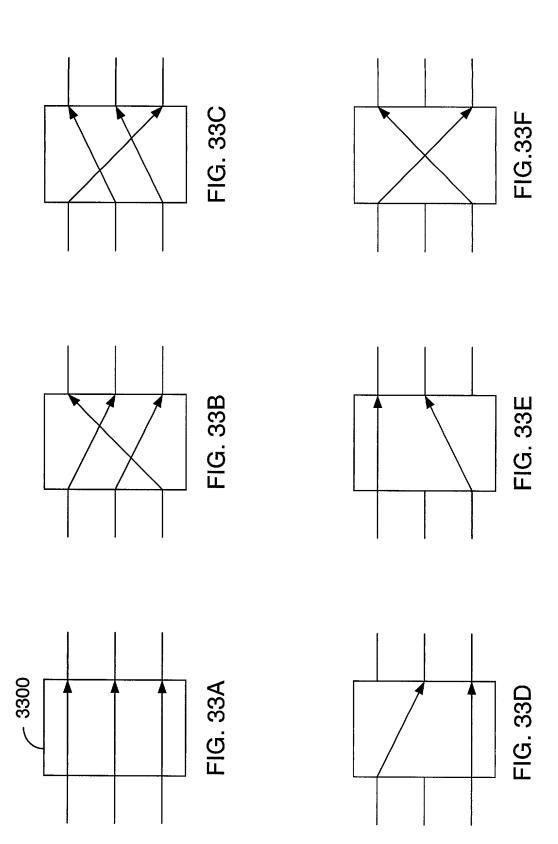


FIG. 32B

FIG. 32A





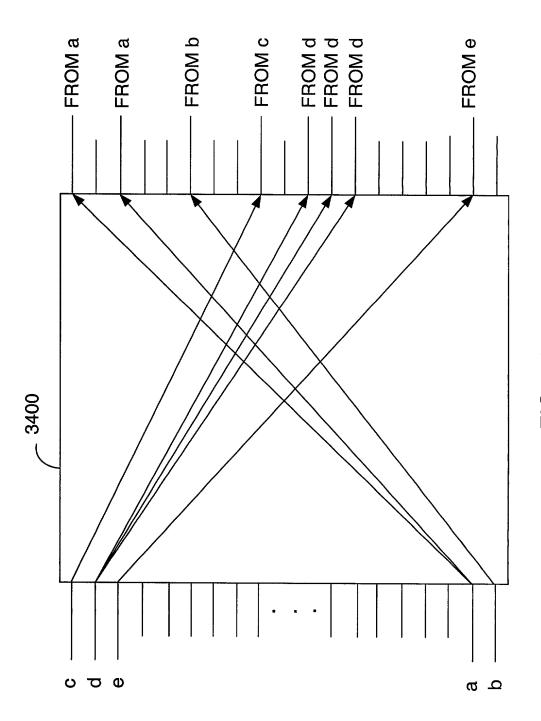
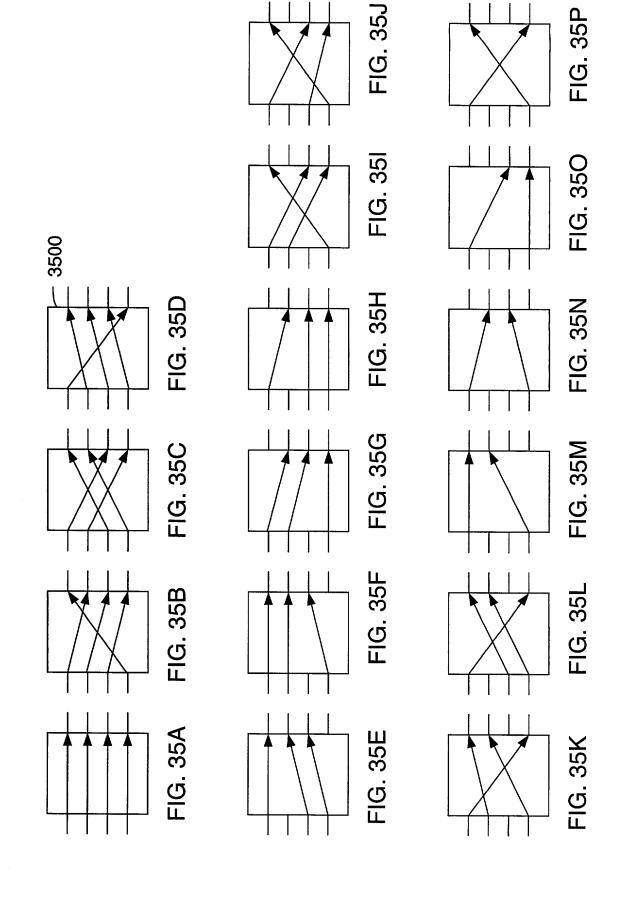
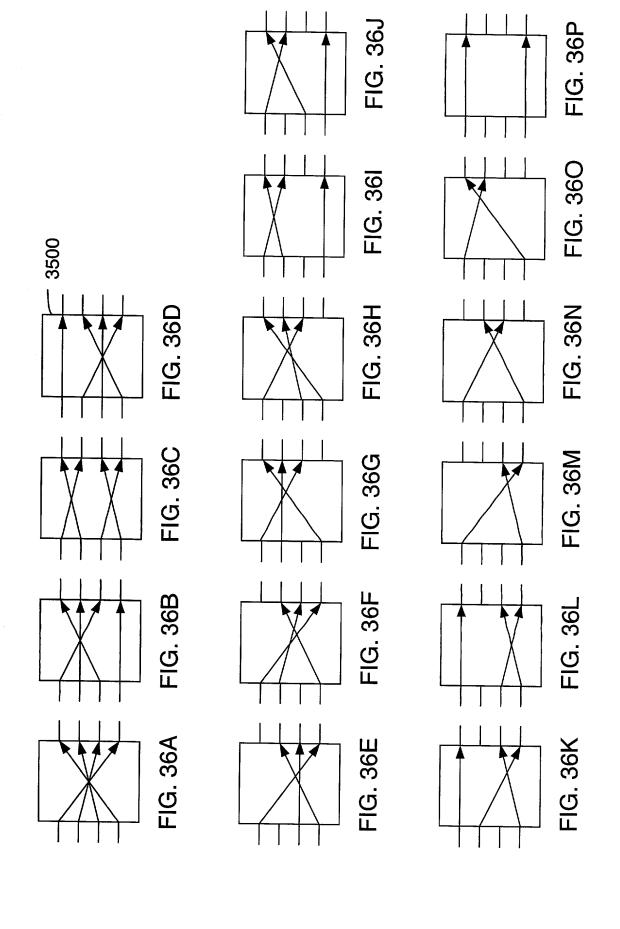
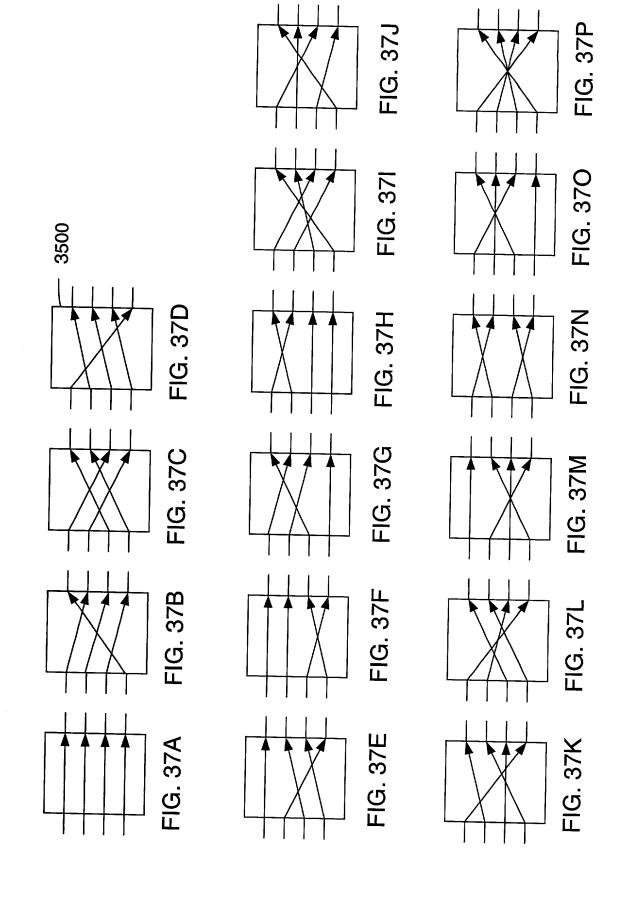
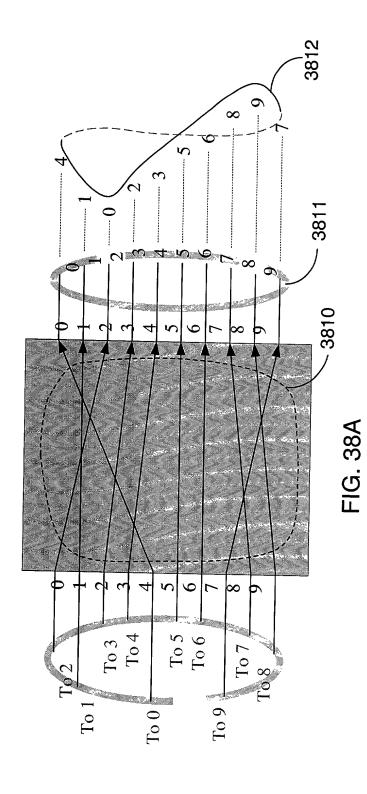


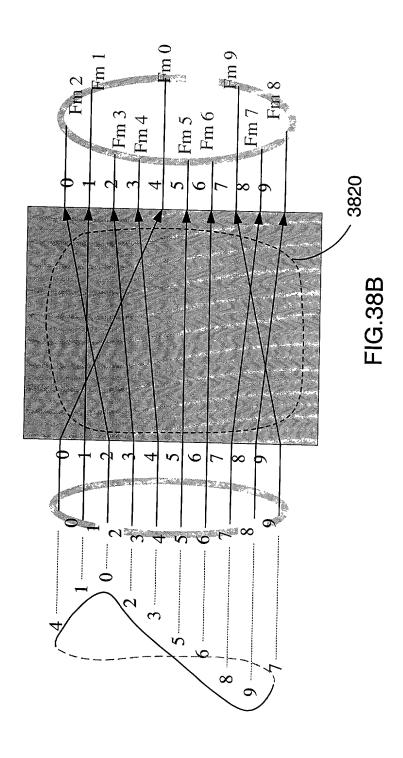
FIG. 34











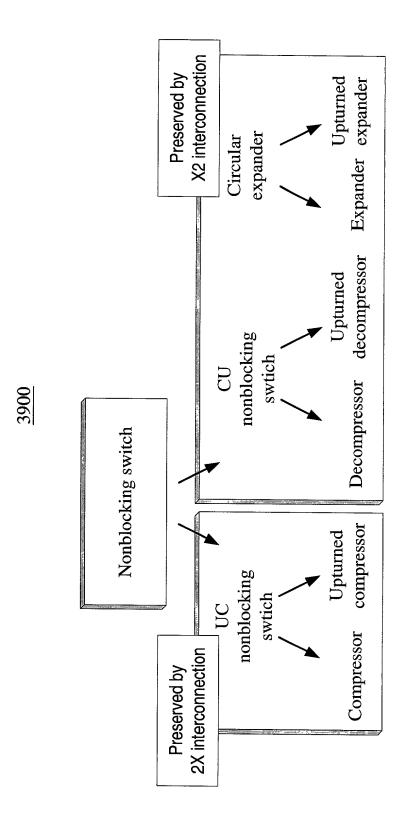
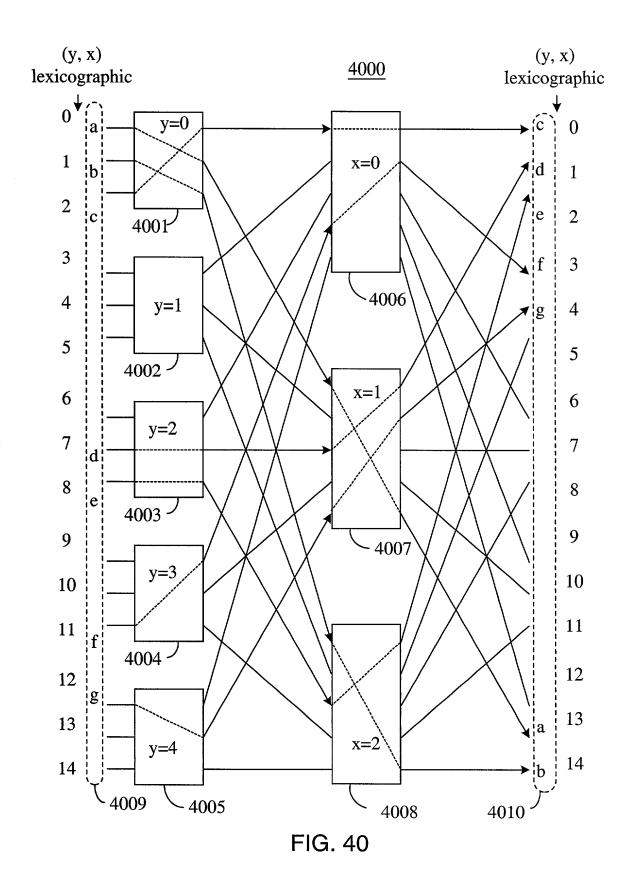


FIG. 39



4100

Preservation of the (1) compressor, (2) upturned compressor and (3) UC nonblocking properties of a switch

Recursive 2X constructions from arbitrary building blocks

Recursive 2X constructions from cells

Banyan-type networks with monotonically decreasing trace and guide

4110

Preservation of the (4) decompressor,

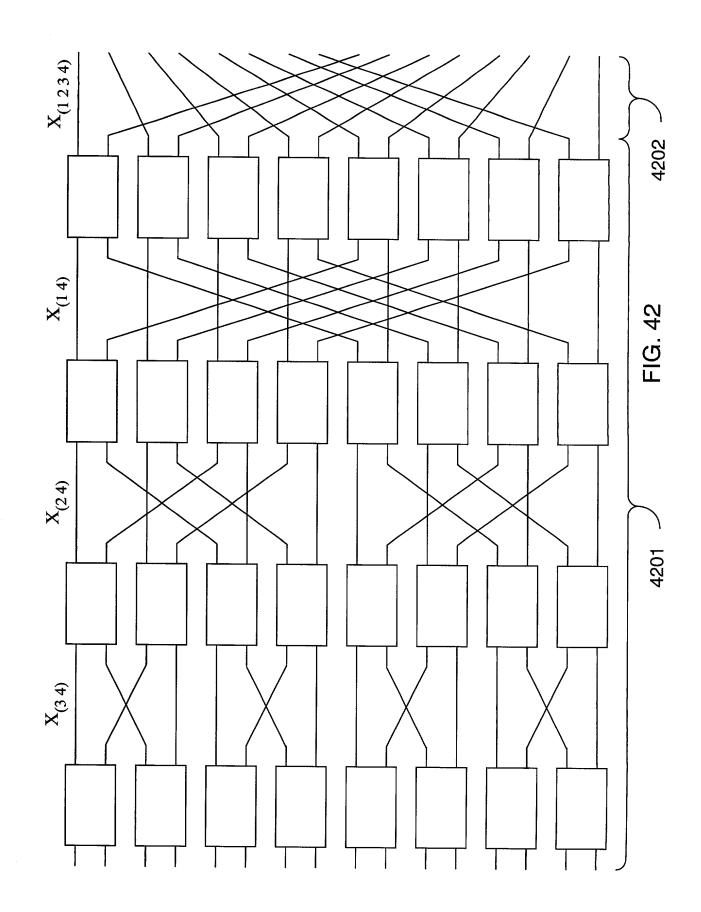
- (5) upturned decompressor,
 - (6) CU nonblocking, (7) expander,
- (8) upturned expander and
 - (9) circular expander properties of a switch

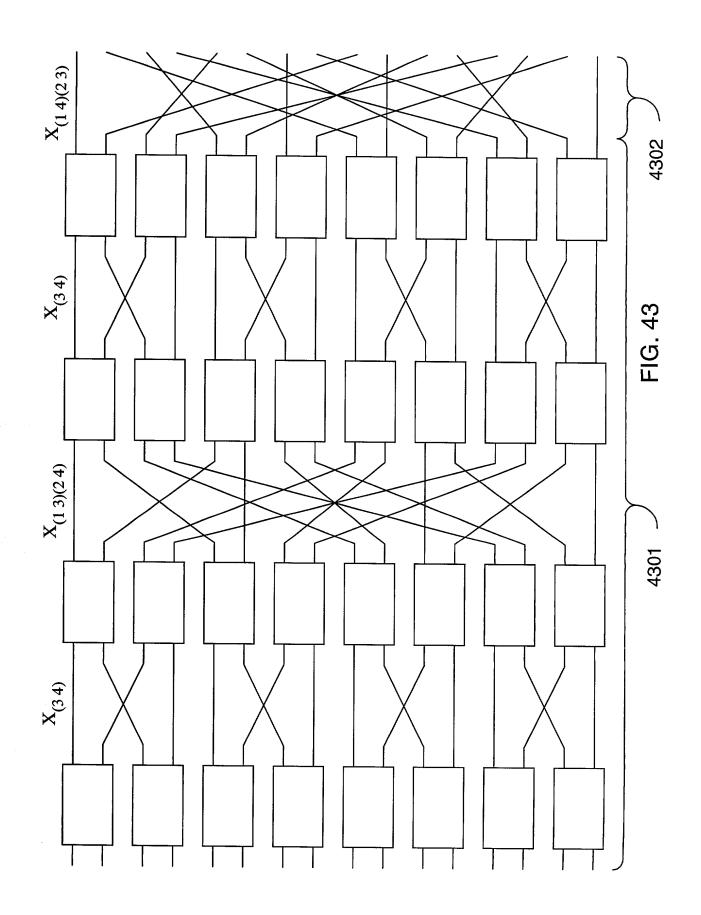
Recursive X2 constructions from arbitrary building blocks

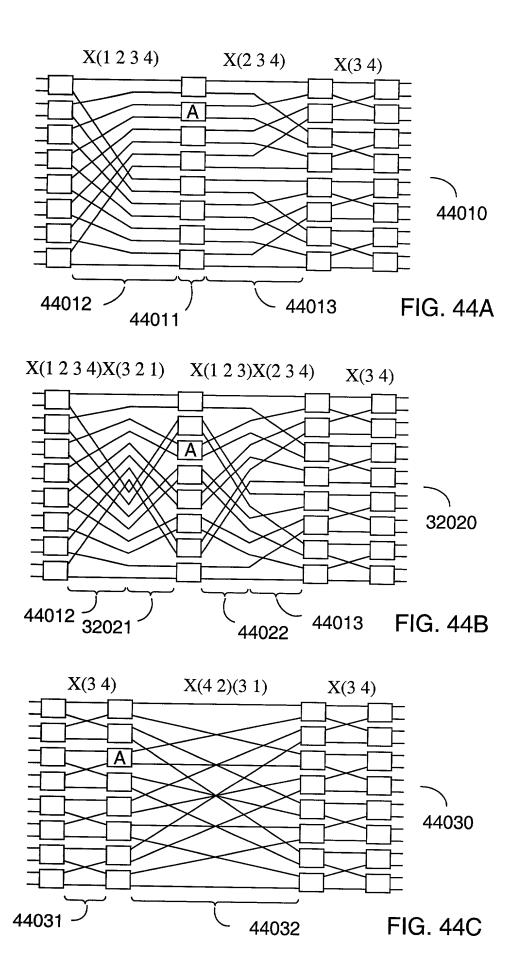
Recursive X2 constructions from cells

Banyan-type networks with monotonically increasing trace and guide

FIG. 41







4500

Equivalence requiring the match of I/O exchanges

(<==> common trace and guide

among the networks)

Equivalence requiring the match of input exchange only (<==> common trace among

Equivalence requiring the match of output exchange only (<==> common guide among

Equivalence without requiring the match of I/O exchanges (unconditional)

FIG. 45

Equivalence

among
banyan-type
networks
in stronger
sense

the networks)

the networks)

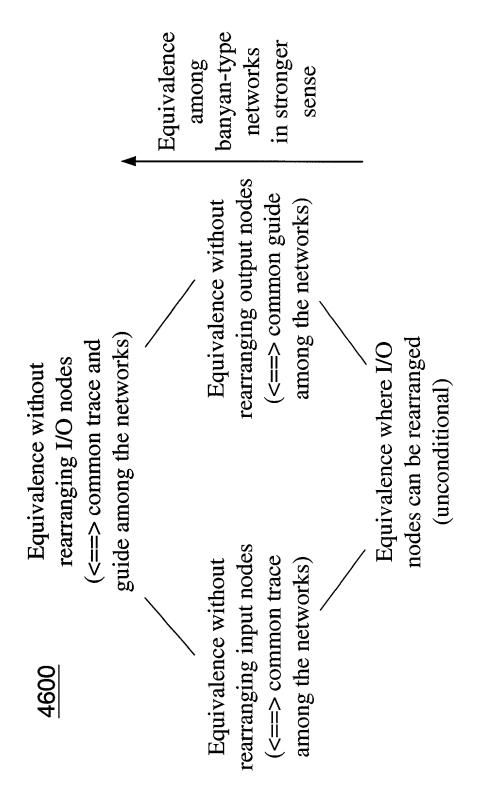


FIG. 46

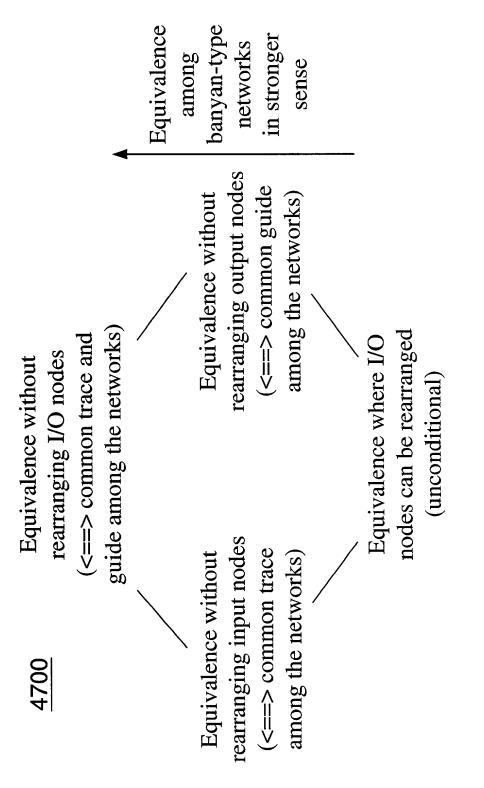


FIG. 47

Equivalence among bitin stronger permuting networks sense rearranging output nodes (<==> common guide among the networks) Equivalence without (<==> trace and guide of one network can be repsectively changed to that of the other Equivalence where I/O nodes can be guide among the networks) network by a permutation) (<==> common trace and rearranging I/O nodes Equivalence without rearranged rearranging input nodes (<==> common trace among the networks) Equivalence without

FIG. 48

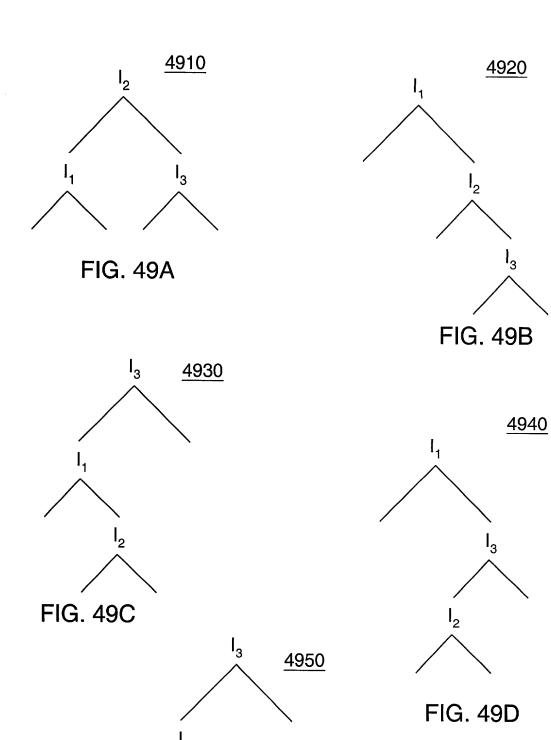
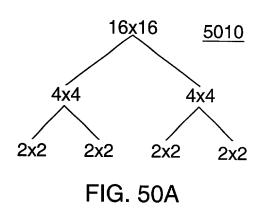
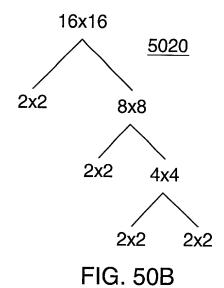
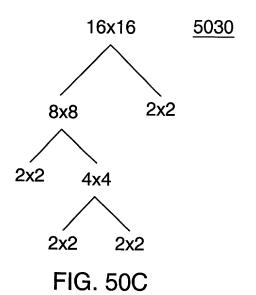
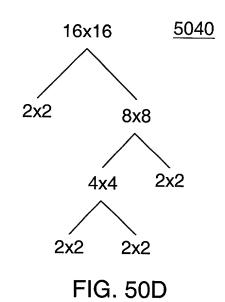


FIG. 49E









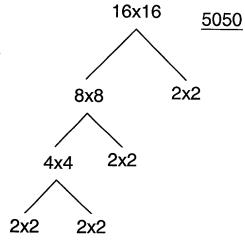


FIG. 50E

<u>5100</u>

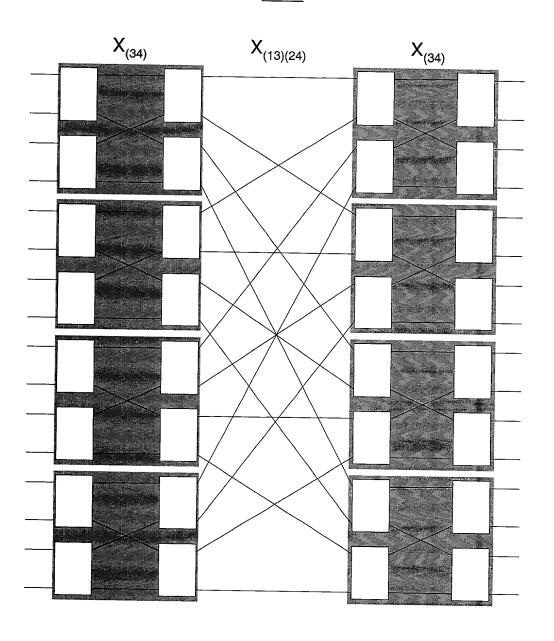


FIG. 51

<u>5200</u>

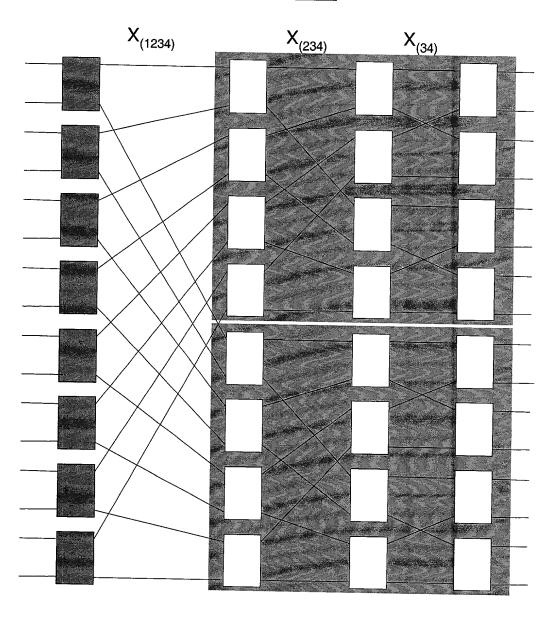
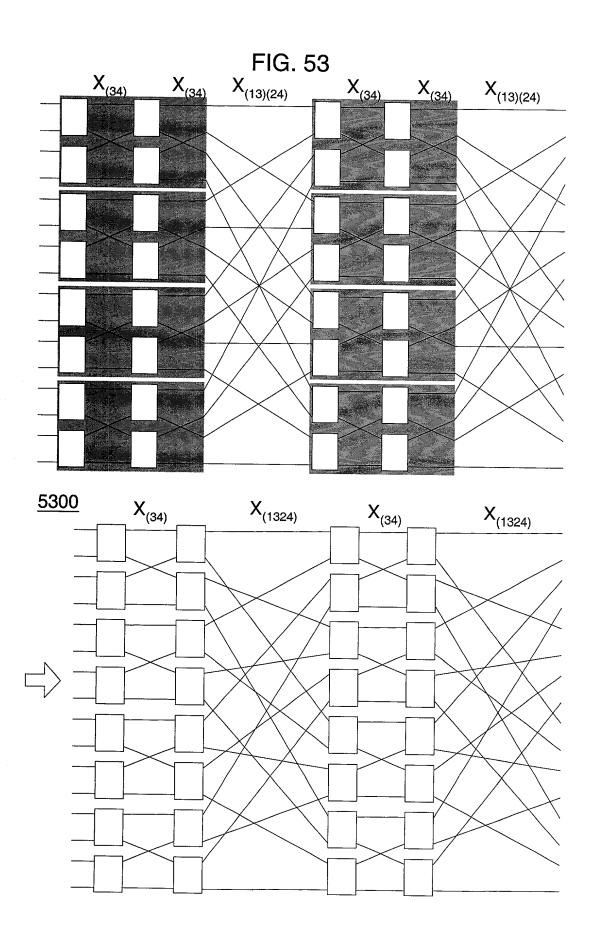


FIG. 52



<u>5400</u>

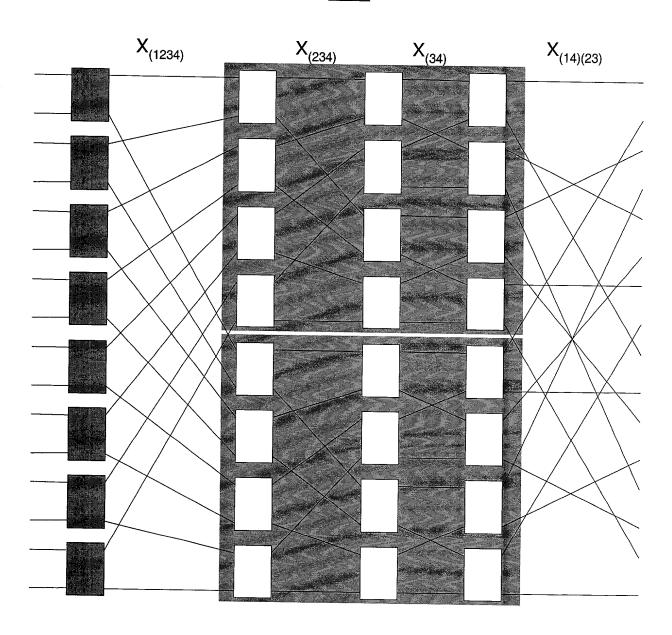


FIG. 54

<u>5500</u>

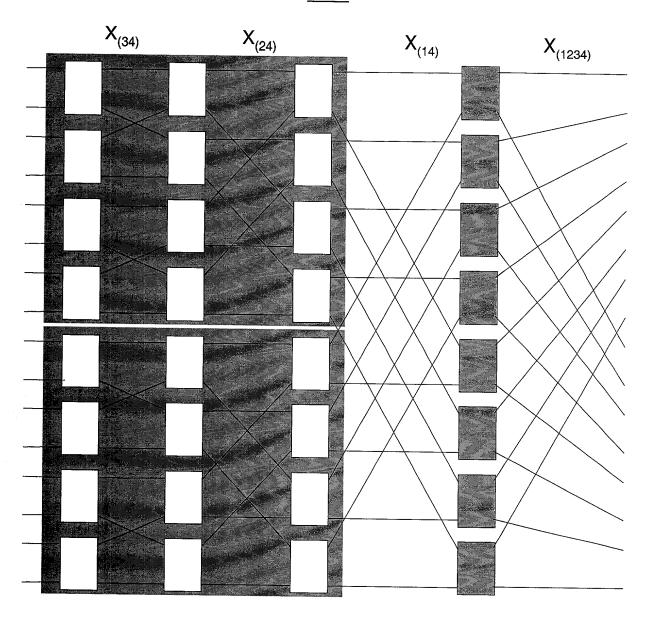
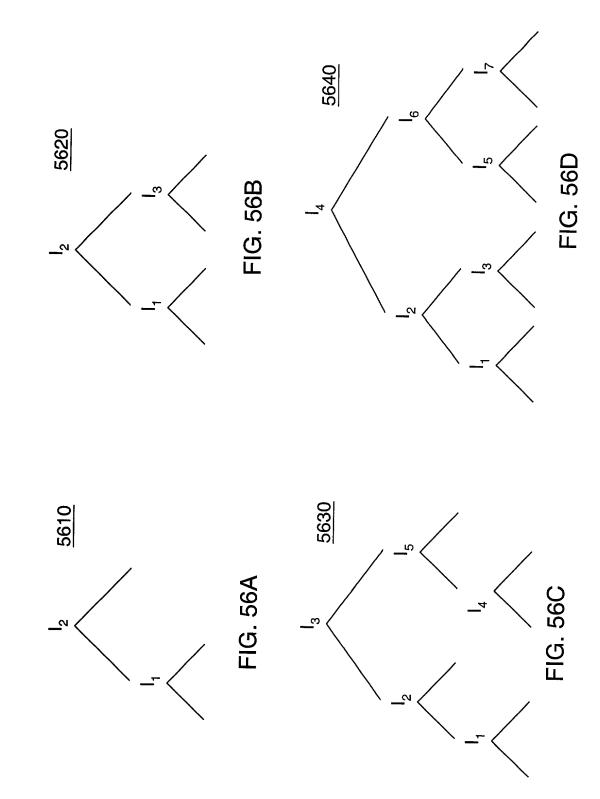
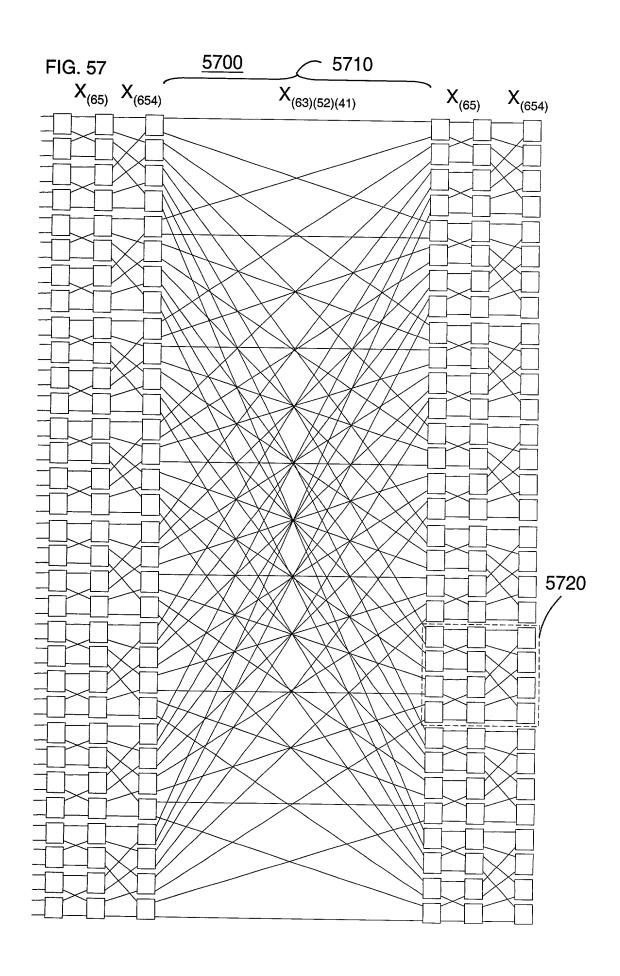
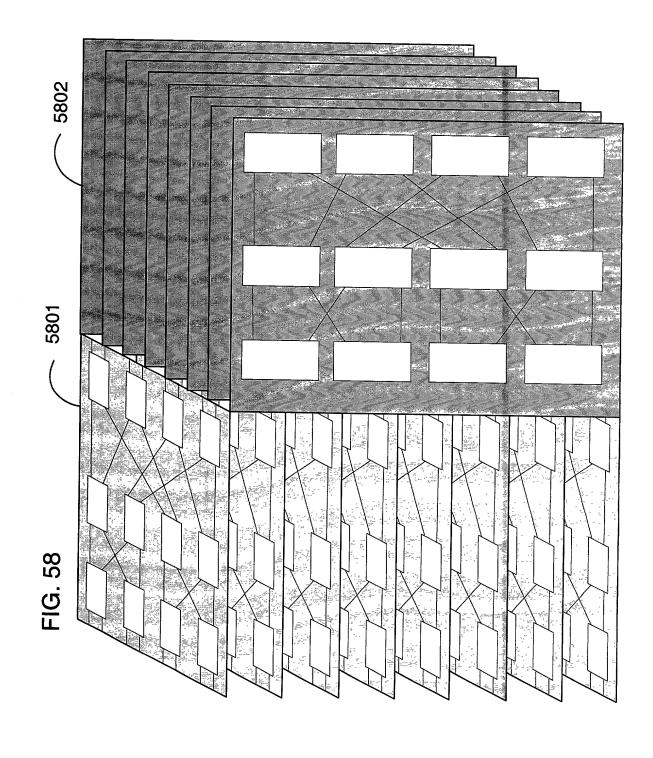
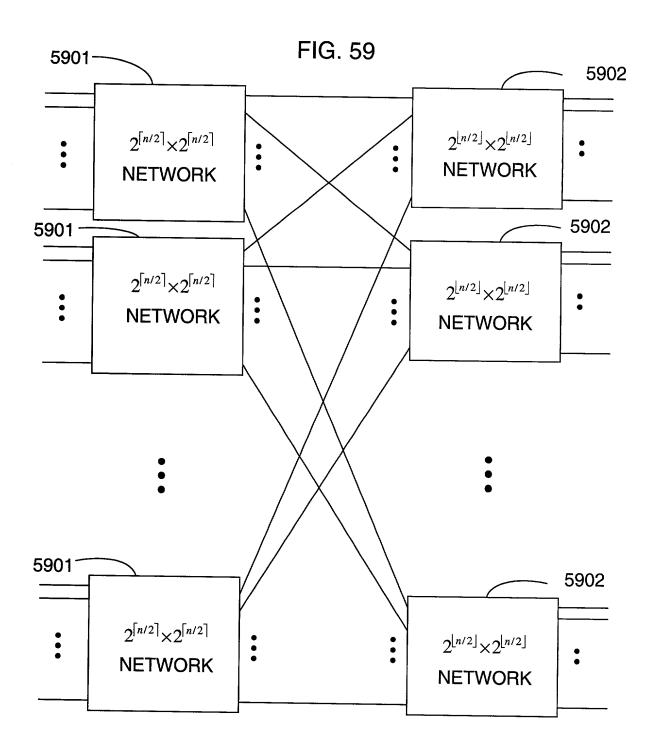


FIG. 55









<u>6000</u>

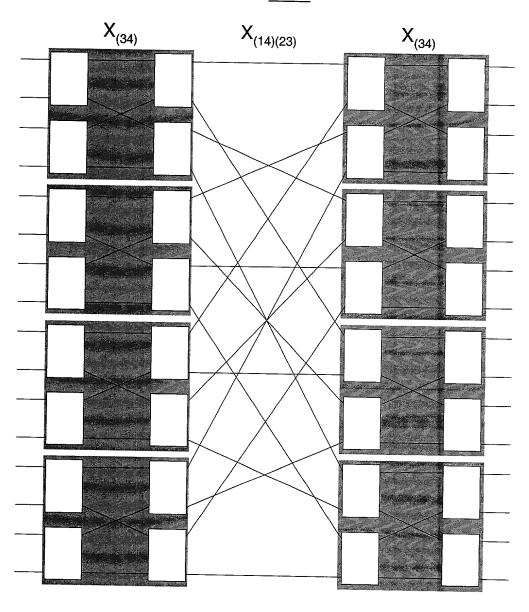
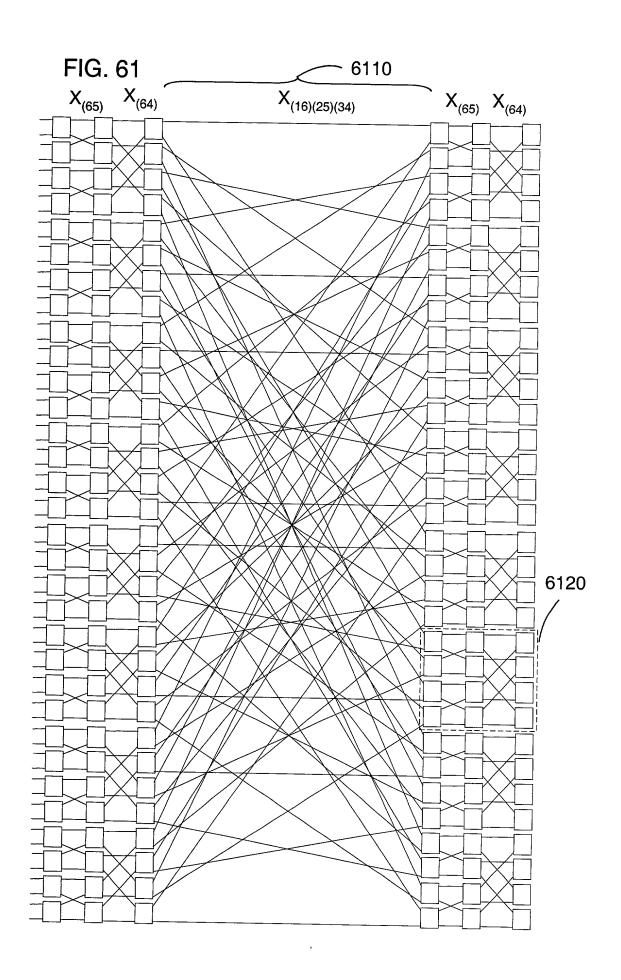


FIG. 60



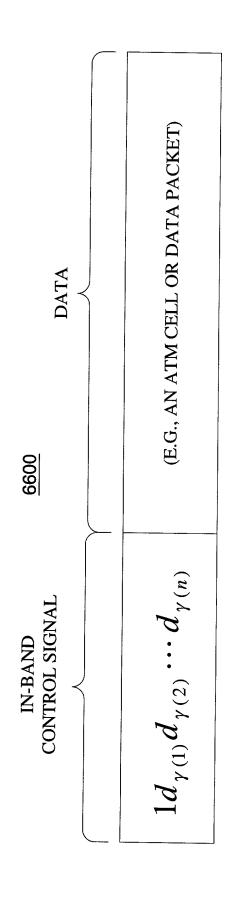


FIG. 66A

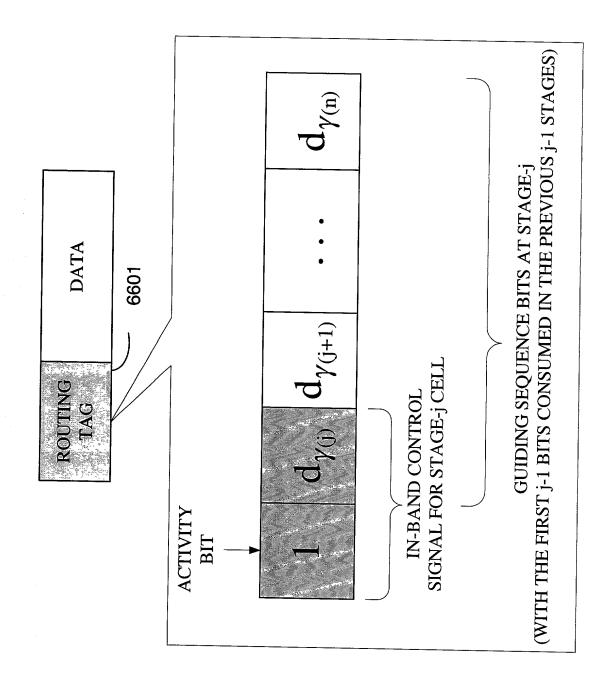
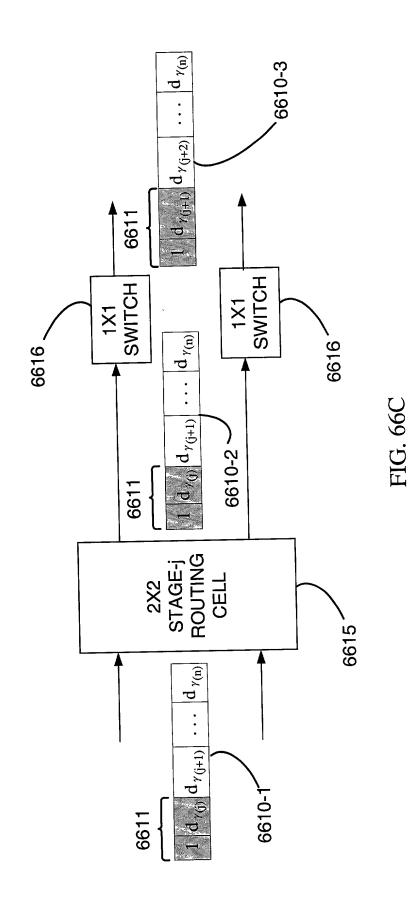


FIG. 66B



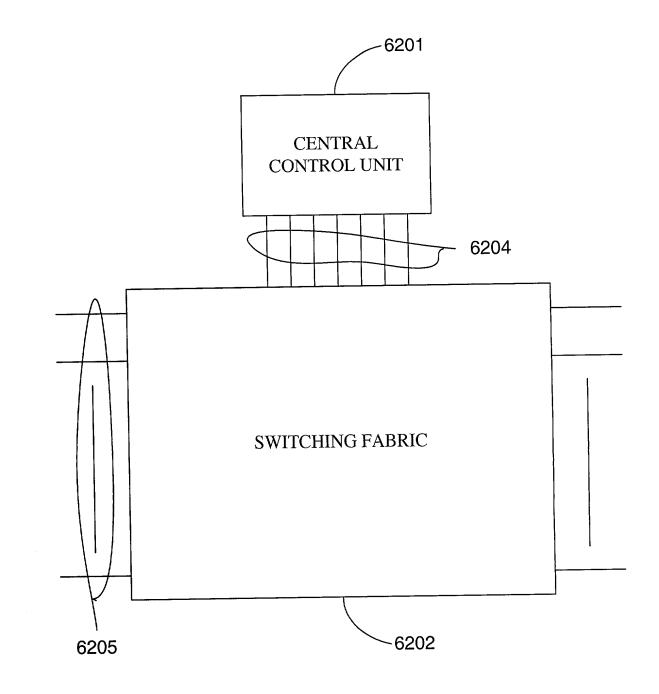


FIG. 62A

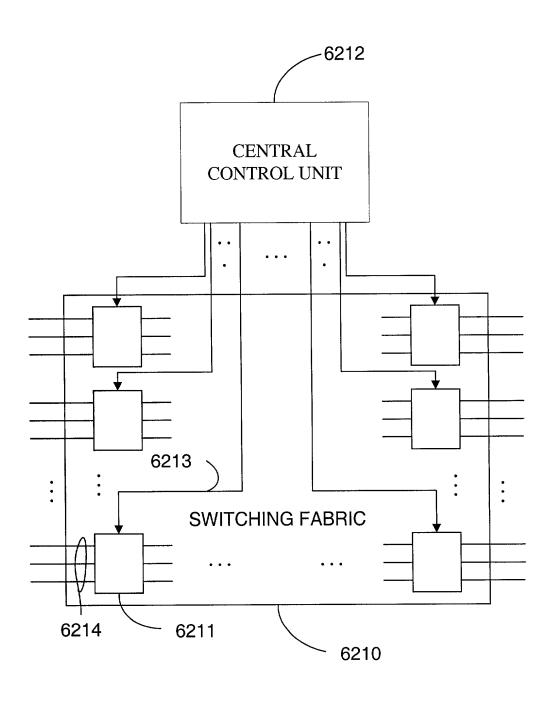
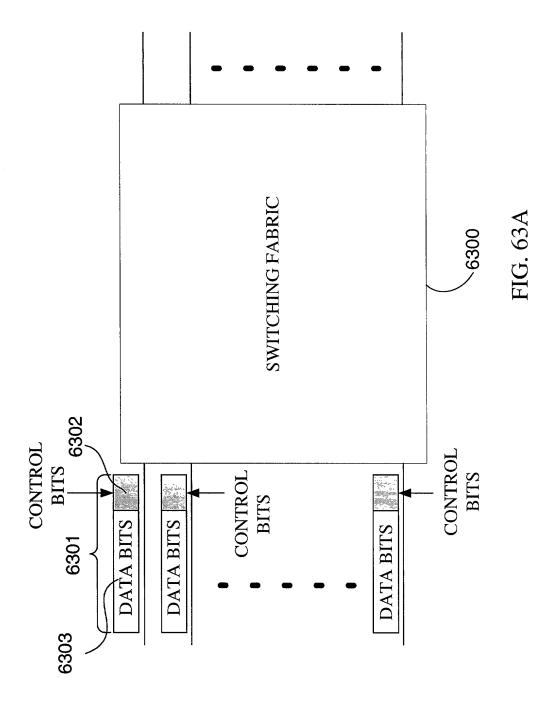


FIG. 62B



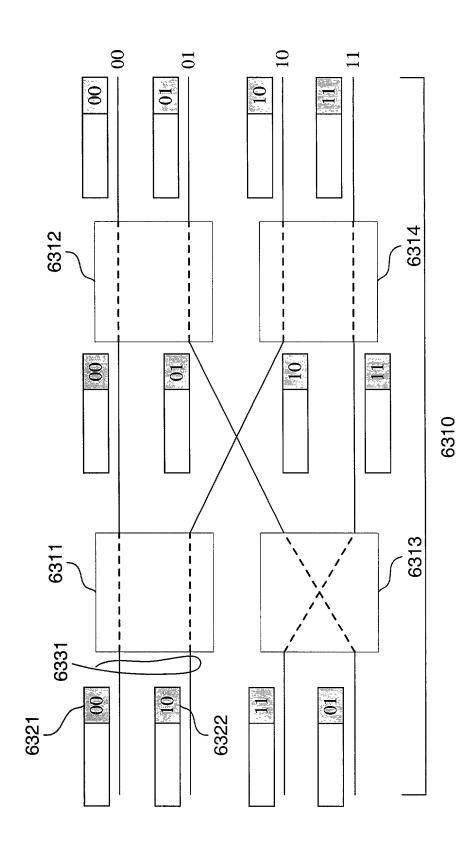


FIG. 63B

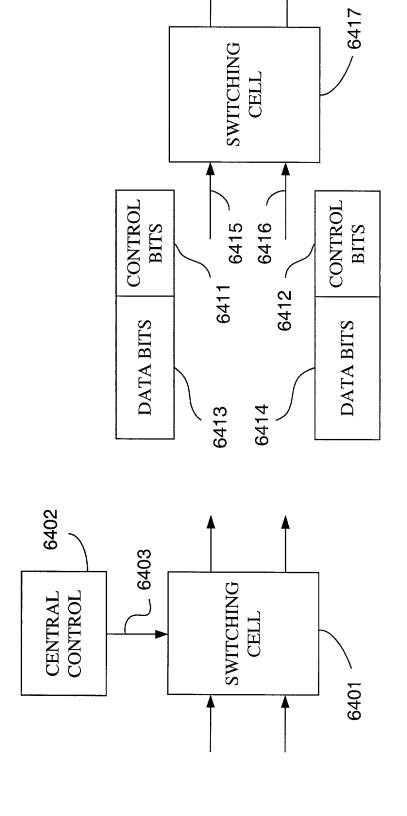
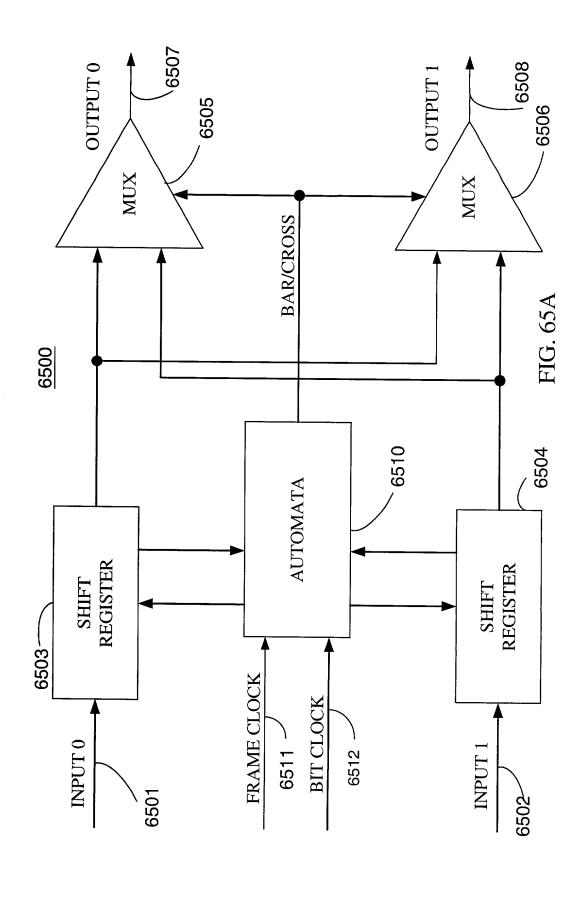


FIG. 64B

FIG. 64A



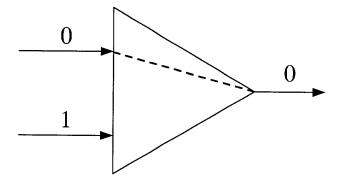


FIG. 65B

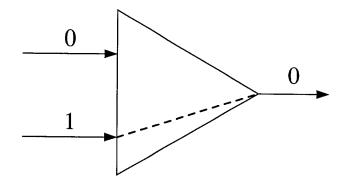


FIG. 65C

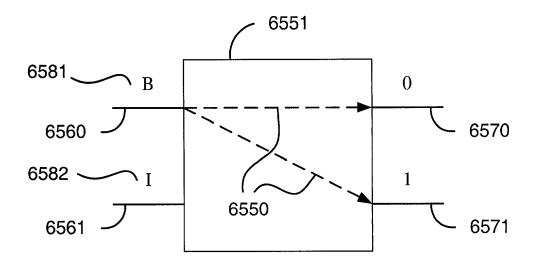


FIG. 65D

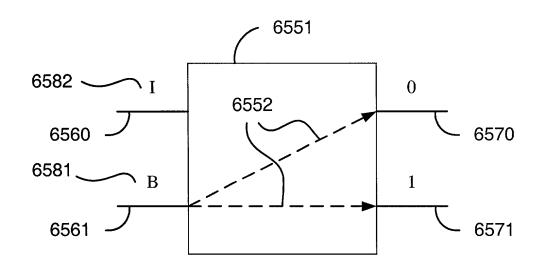
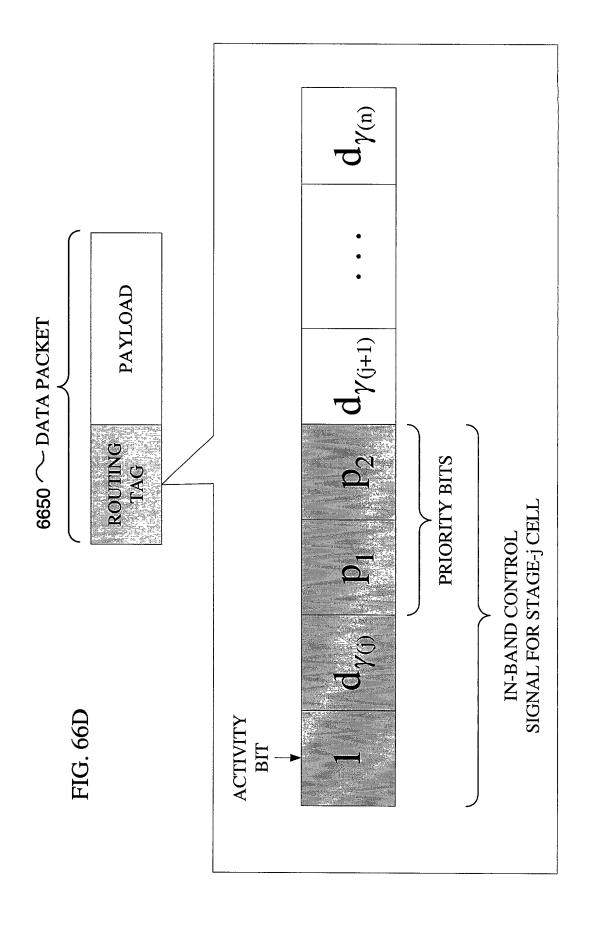
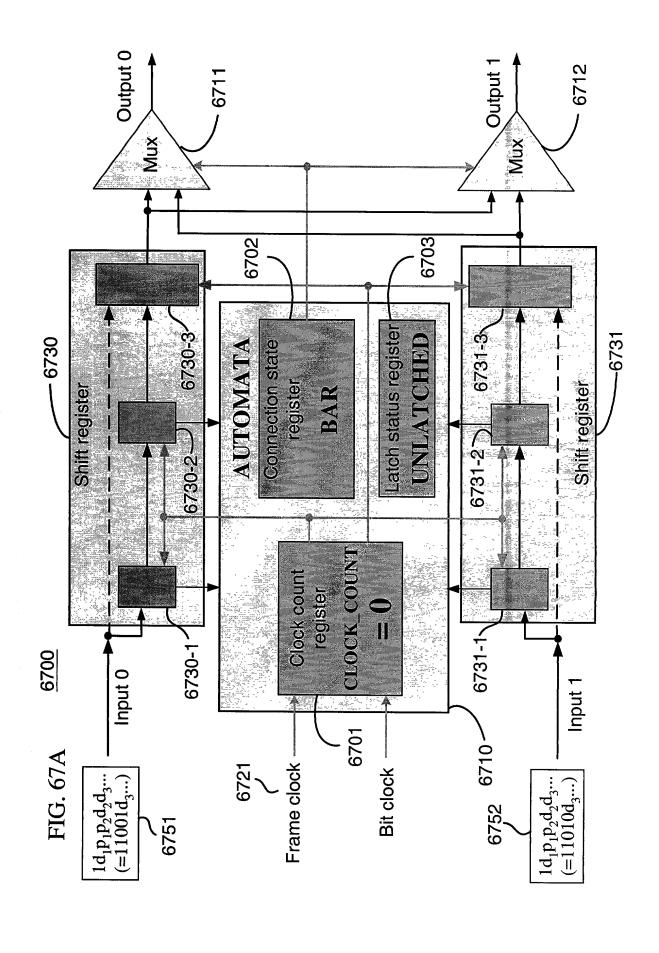
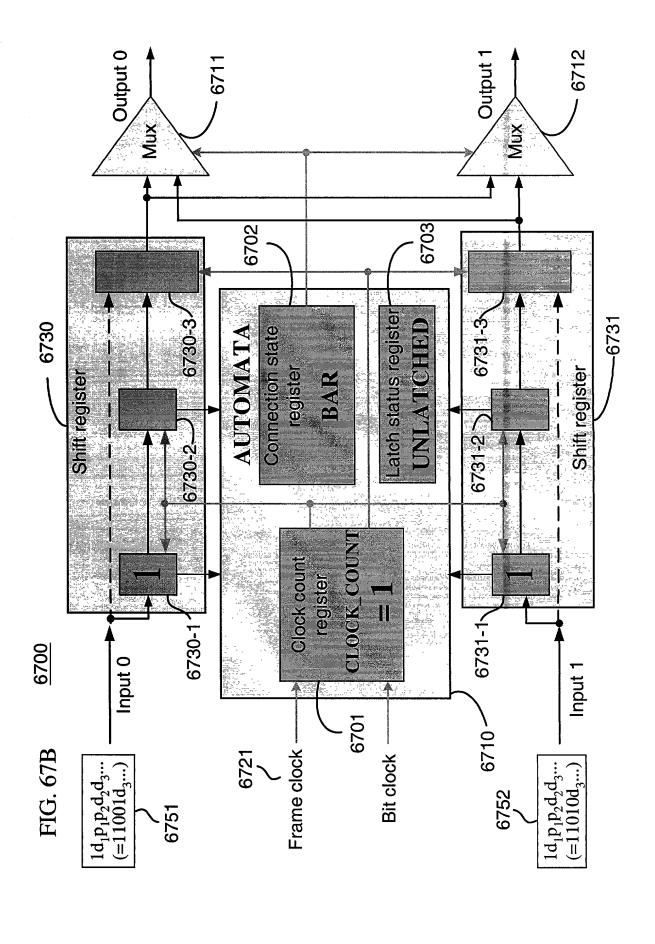
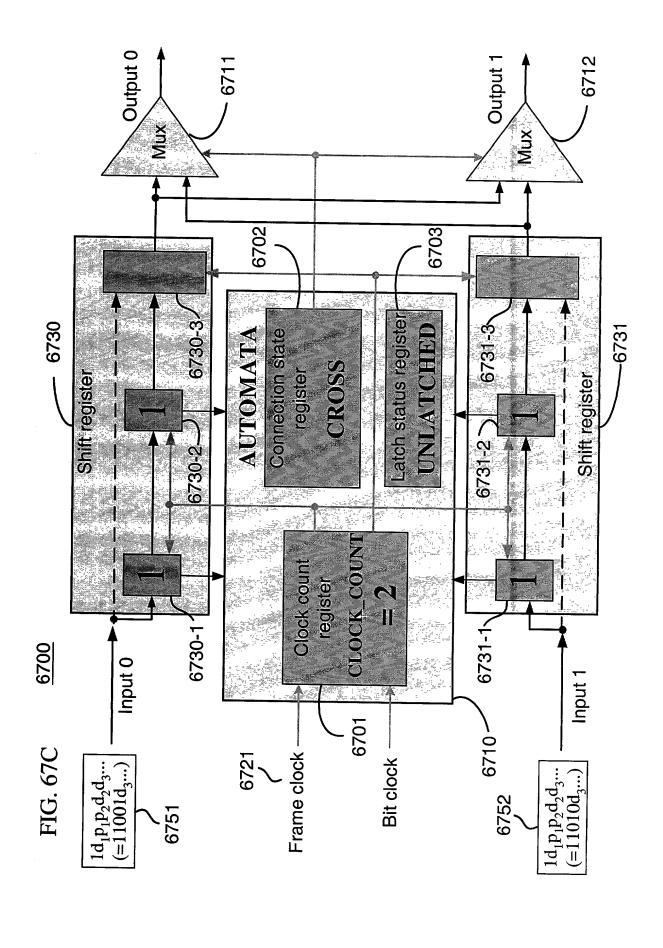


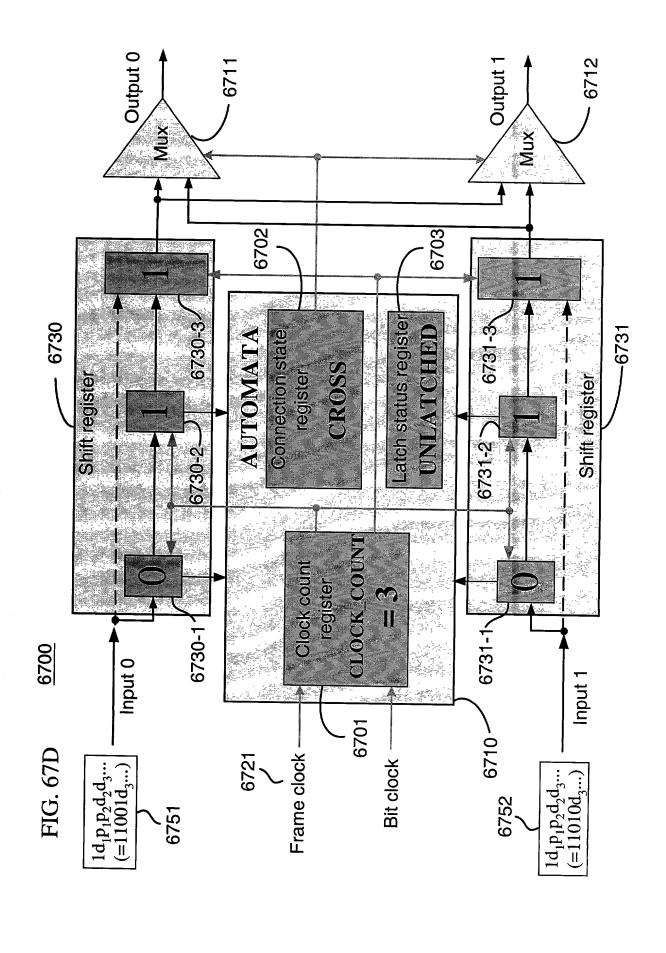
FIG. 65E

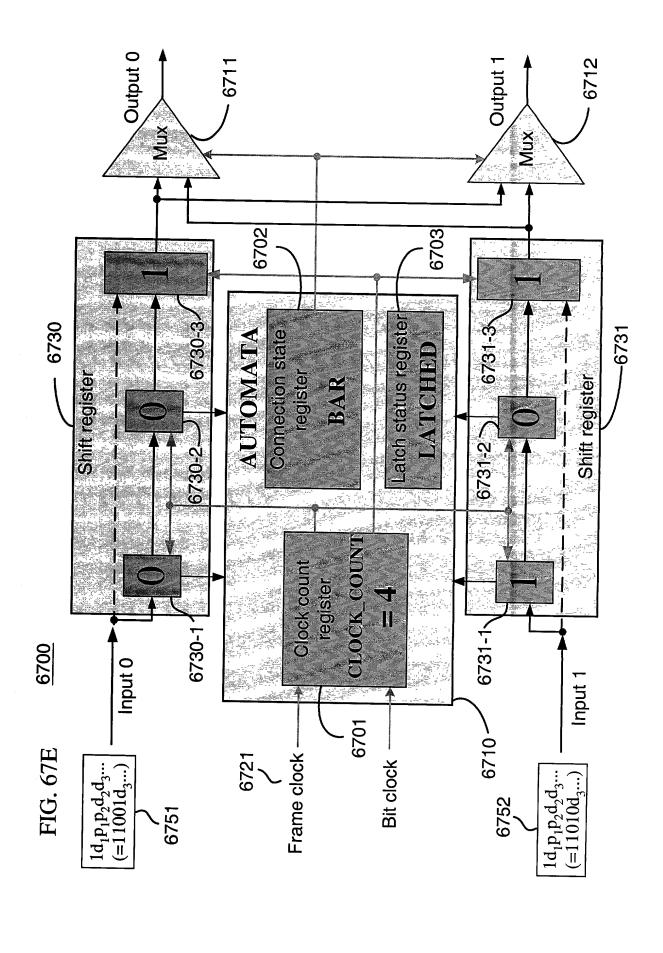


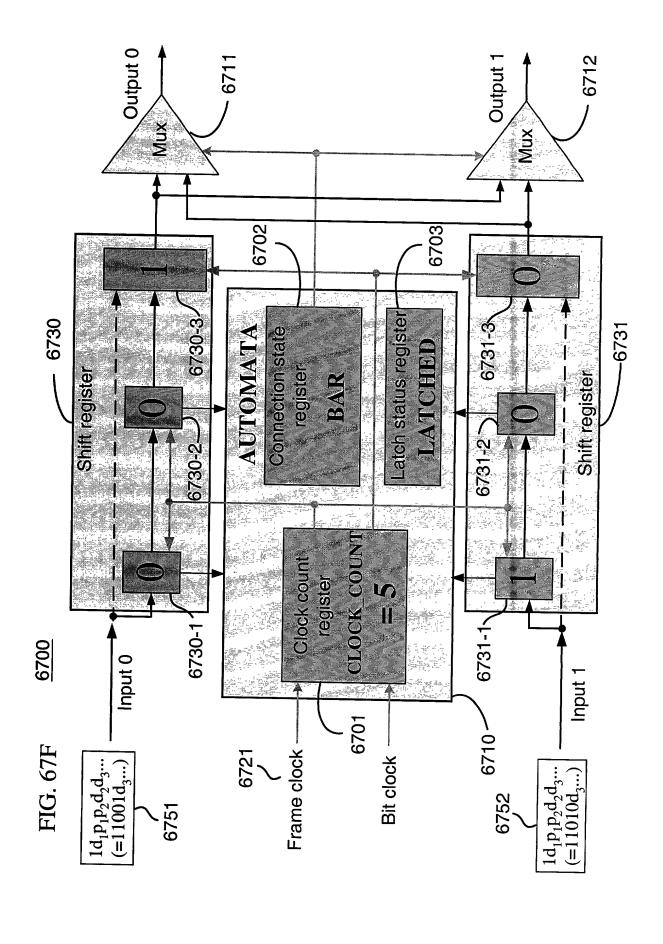












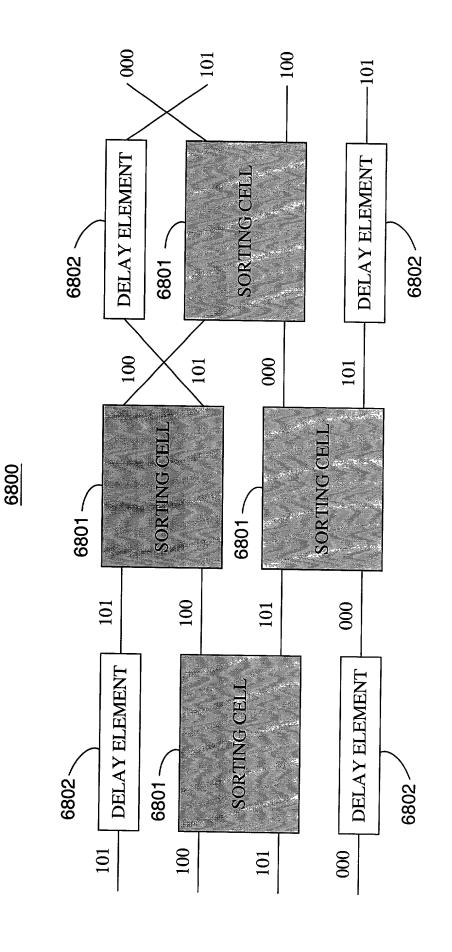
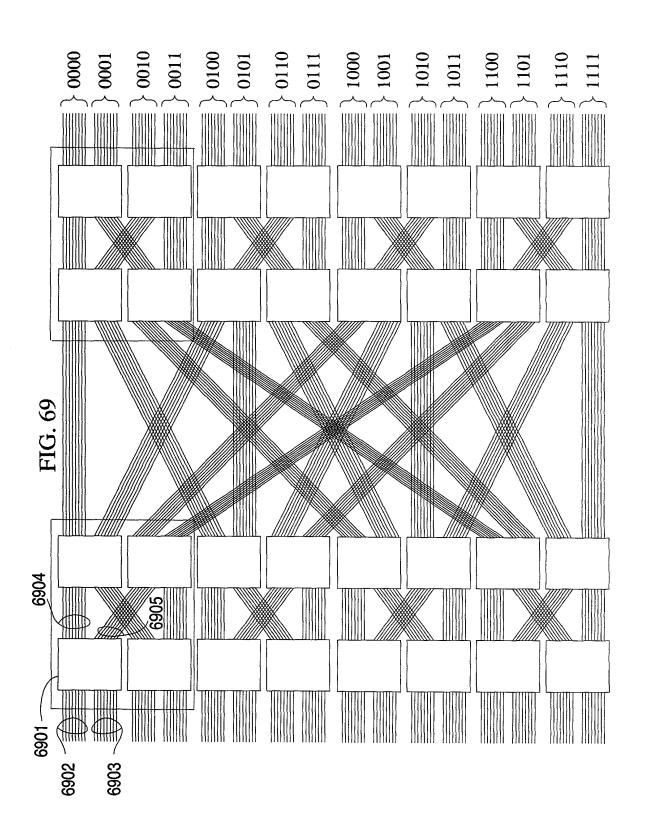
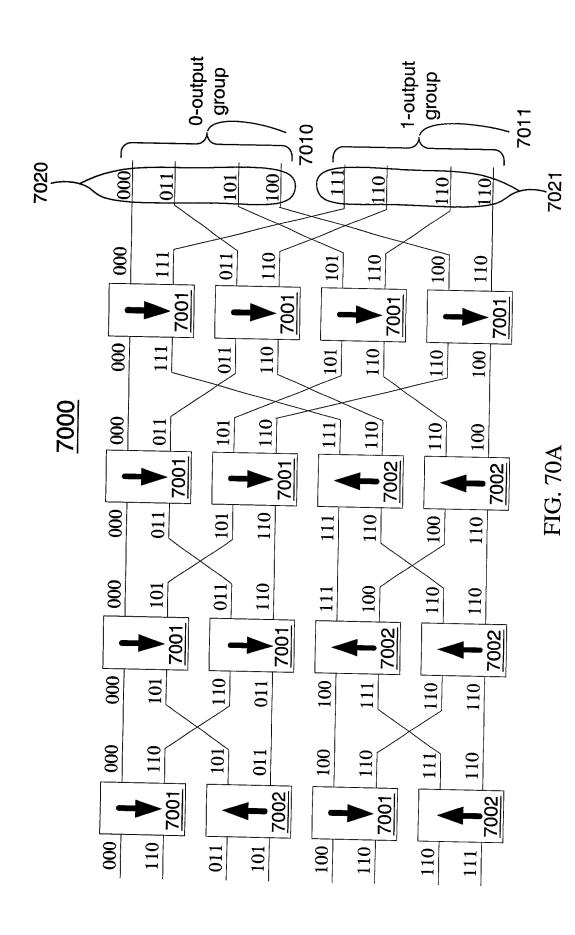
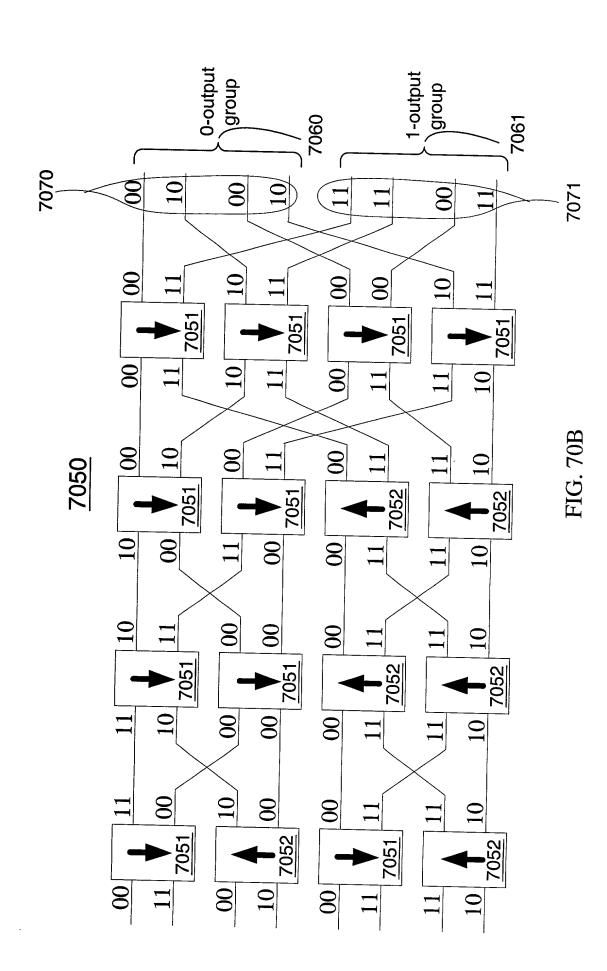


FIG. 68







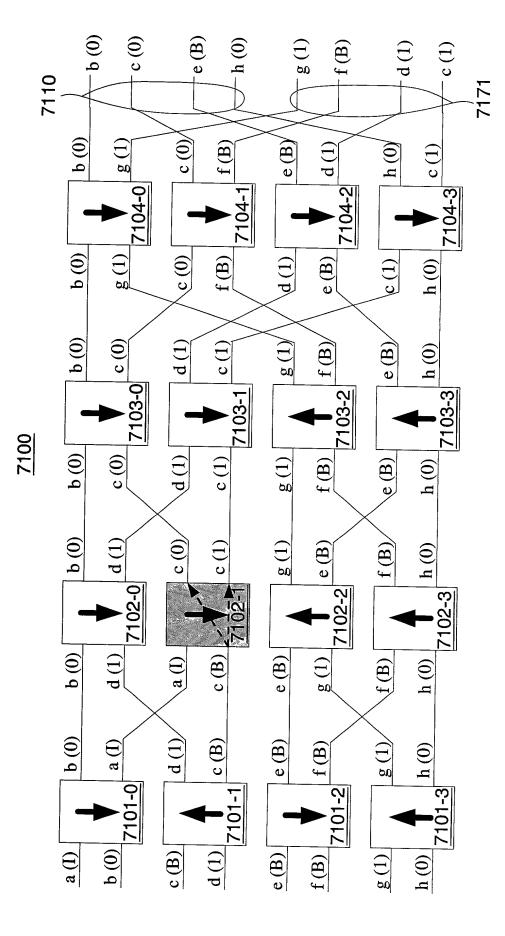


FIG. 71A

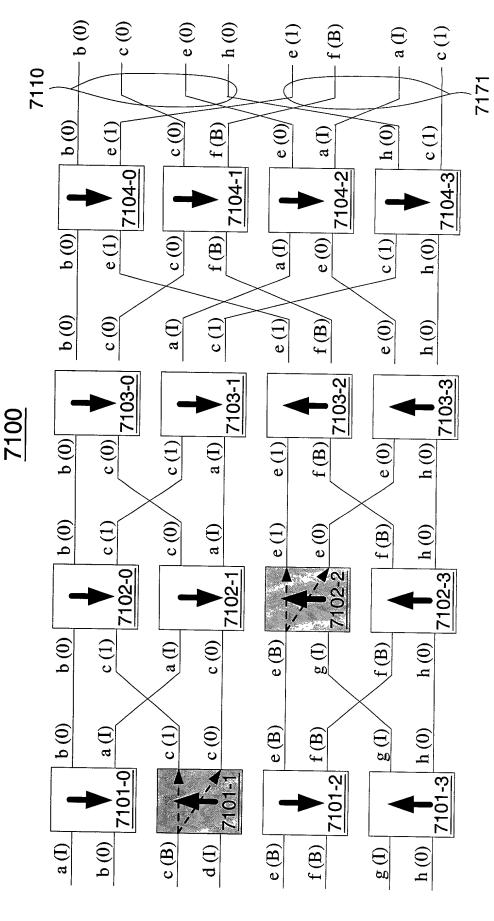


FIG. 71B

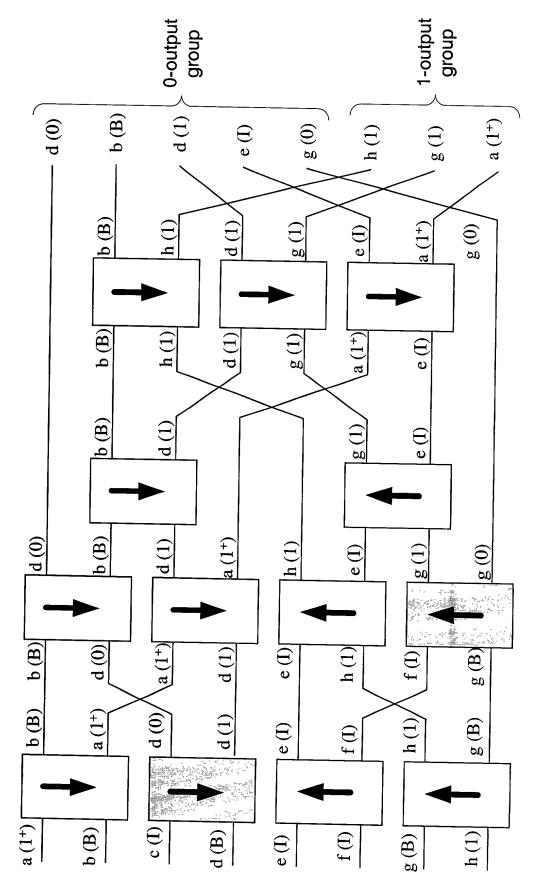


FIG. 72A

